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# **Space Shuttle Pad Exposure Period Meteorological Parameters STS–1 Through STS–107**

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***September 2005***

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## **PREFACE**

This Technical Memorandum (TM) contains a summary of all Space Shuttle pad exposure period meteorological data collected over a period of 22 yr. The data used to create the graphs are available through the Natural Environments Branch, Spacecraft and Vehicle Systems Department of the Marshall Space Flight Center Engineering Directorate.

For more detailed information, or to obtain the data used in this TM, contact:

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## LIST OF ACRONYMS

ANG	above natural grade
ET	external tank
KSC	Kennedy Space Center
LC	launch complex
LP	launch pad
MET	meteorological
MSFC	Marshall Space Flight Center
MSL	mean sea level
SLP	sea level pressure
STS	Space Transportation System
TM	Technical Memorandum
UTC	coordinated universal time
WBAN	Weather Bureau Army/Navy
WMO	World Meteorological Organization



## **TECHNICAL MEMORANDUM**

### **SPACE SHUTTLE PAD EXPOSURE PERIOD METEOROLOGICAL PARAMETERS STS-1 THROUGH STS-107**

#### **1. INTRODUCTION**

The purpose of this Technical Memorandum (TM) is to provide a quick reference to the natural atmospheric environmental conditions to which each vehicle in the Space Shuttle fleet has been exposed during the period from rollout through launch. Data are provided from the first launch of the Space Transportation System (STS) in 1981 through the launch of STS-107 in 2003. All the data presented in this TM are archived by the Marshall Space Flight Center (MSFC) Natural Environments Branch.

## **2. MARSHALL SPACE FLIGHT CENTER NATURAL ENVIRONMENTS BRANCH**

The MSFC Natural Environments Branch is part of the Engineering Directorate. The mission of the Branch is to provide information on naturally occurring space environments, terrestrial environments, and planetary atmospheric environments to customers at MSFC and other NASA Centers. The Natural Environments Branch's Terrestrial and Planetary Environments team archives and models the terrestrial environment to support aerospace vehicle design, development, and analysis and models planetary environments to be used for aerospace vehicle engineering studies.

The Terrestrial and Planetary Environments team has been tasked by the Space Shuttle program to provide technical support to the natural environments area. This includes certifying new atmospheric instrumentation for use by the Space Shuttle program, archiving surface and upper atmospheric thermodynamic and wind measurements made at Kennedy Space Center (KSC) and the U.S. Air Force Eastern Range, climatological modeling, day-of-launch wind profile monitoring and verification, documentation of atmospheric environment during ascent—the final meteorological profile, and terrestrial environment requirements development.

### 3. DATA SOURCES DESCRIPTIONS

The data in this TM were obtained from surface observations and meteorological (MET) towers at KSC.

#### 3.1 Surface Observations

Hourly surface observations from two sites are included in the archive and used for this TM. Table 1 gives the source information, including the station call sign, Weather Bureau Army/Navy (WBAN) designation, World Meteorological Organization (WMO) designation, approximate location with respect to Launch Complex 39 (LC-39), and period of record for the archive. The location of these observation stations is shown in figure 1.

Table 1. Surface observation stations.

Source	Location	Period of Record
Cape Canaveral Air Force Station Call sign: XMR WBAN station No. 12868	16 km (8.6 nmi) south-southeast of LC-39	December 1980 through November 1984
Shuttle landing facility Call signs: X68, TTS, and KTTS WMO station No. 74794 WBAN station No. 12886	8 km (4.3 nmi) west-northwest of LC-39	December 1984 to present

Due to questionable hourly precipitation data from station 12868, daily precipitation totals as measured at station 12886 and provided by the Air Force Combat Climatology Center are presented in this TM through STS-86 (September 1997). After STS-86, precipitation measured near the pads with optical rain gauges is presented.

The surface observation data in this TM were obtained near ground level. Temperature, relative humidity, pressure, and precipitation are measured at approximately 1.5 m (5 ft) above ground level. Wind speed and direction are measured at approximately 9 m (30 ft) above ground level.

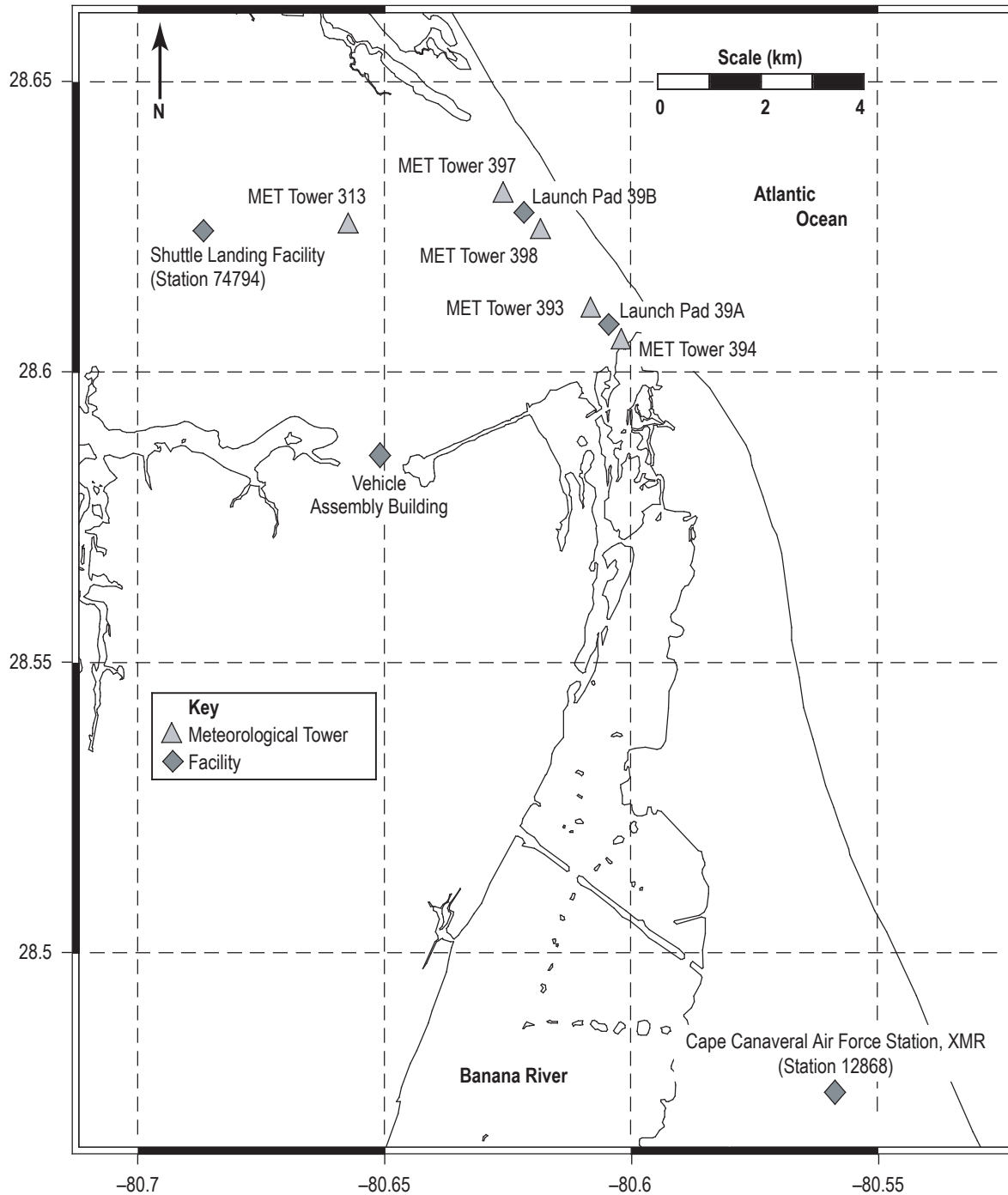


Figure 1. KSC meteorological observation locations.

### 3.2 Meteorological Towers

Data from six MET towers have been archived by the MSFC Natural Environments Branch and are used in this TM. Table 2 summarizes the location of these towers (fig. 1) with respect to launch pads (LPs) 39A and 39B.

Table 2. Meteorological tower locations.

MET Tower No.	Location
393	0.4 km (0.22 nmi) northwest of LP 39A at camera site 6
394	0.4 km (0.22 nmi) southeast of LP 39A at camera site 3
397	0.4 km (0.22 nmi) northwest of LP 39B at camera site 6
398	0.4 km (0.22 nmi) southeast of LP 39B at camera site 3
313	5.5 km (3 nmi) west-northwest of LP 39A
3131	Northeast side of tower 313
3132	Southwest side of tower 313

The wind data from towers 393, 394, 397, and 398 were measured at 18.3 m (60 ft) above natural grade (ANG). The temperature, humidity, and dewpoint from towers 393, 394, 397, and 398 were measured at both 1.8 m (6 ft) ANG, which is equivalent to approximately 6.4 m (21 ft) above mean sea level (MSL), and 18.3 m (60 ft) ANG. All data from tower 313 were measured at 16 m (54 ft) ANG because tower 313 is not instrumented at 18.3 m (60 ft) ANG.

From STS–56 (March 1993) to STS–80 (October 1996), the tower data consist of temperature, dewpoint, relative humidity, wind speed, and wind direction. After this time, pressure measurements were added to towers 394 and 398 only. The pressure data were measured at approximately 6.4 m (21 ft) above MSL. The measured pressure values were adjusted to sea level pressure (SLP) to provide a common reference level using equation (1):

$$SLP = P_{\Delta Z} \left( 1 + \frac{\Delta Z}{\bar{H}} \right) \quad (1)$$

where  $P_{\Delta Z}$  is the measured (barometric) pressure,  $\Delta Z$  is the height of the barometer above sea level in meters, and  $\bar{H}$  is the scale height (8,500 m). This equation is a simplified form of the hypsometric equation and is accurate to within about 0.1 hPa (0.003 inHg) for  $\Delta Z$  less than 120 m (394 ft).

Equation (1) can be used to calculate the pressure at a given height above sea level using the sea level pressures in this TM, provided that the given height is less than 120 m (394 ft). The equation in this form is

$$P_{\Delta Z} = \frac{SLP}{\left( 1 + \frac{\Delta Z}{\bar{H}} \right)}, \quad \Delta Z \leq 120 \text{ m} . \quad (2)$$

Also, after STS–80, optical rain gauges were added to towers 393, 394, 397, and 398. The optical rain gauges provide 1-s precipitation measurements. These data were available only sporadically until STS–87 (October 1987).

#### 4. SPACE TRANSPORTATION SYSTEM PAD EXPOSURE PERIOD EXTREMES

Table 3 provides a summary of the meteorological parameter extremes for each mission's pad exposure period. The data from table 3 are shown graphically in figures 2–6; also shown are the overall extremes for each parameter for all missions. Figure 4 shows the increase in the maximum wind speed after STS–54 as, prior to STS–56, the wind measurements were taken at 9 m (30 ft) ANG. After that time, the wind measurements were taken at 18.3 m (60 ft) ANG.

Table 3. Meteorological parameter extremes.

Mission	Minimum Temperature (°C)	Maximum Temp. (°C)	Minimum Relative Humidity (%)	Maximum Relative Humidity (%)	Maximum Wind Speed (m/s)	Wind Direction (deg)	Minimum Sea Level Pressure (hPa)	Maximum Sea Level Pressure (hPa)	Total Precipitation (mm)
STS–1	–5	31	13	100	13	290	999.3	1033.2	152.1
STS–2	9	34	36	100	11	360	1009.5	1024.7	332.7
STS–3	5	32	22	100	13	180	1006.1	1030.5	75.2
STS–4	21	33	45	100	14	180	1005.8	1021	203.5
STS–5	11	31	41	100	9	360	1006.8	1024	102.1
STS–6	2	29	25	100	14	60	991.4	1027.8	482.1
STS–7	17	32	26	100	11	250	1006.1	1018.3	177
STS–8	22	36	52	100	8	320	1010.8	1022.4	123.2
STS–9	5	33	34	100	8	290	1008.8	1024	136.4
41–B	3	28	27	100	10	320	1010.5	1029.8	53.6
41–C	9	30	25	100	14	270	994.7	1022.7	92.7
41–D	12	36	32	100	9	180	1009.8	1023.4	404.9
41–G	14	33	44	100	13	90	1006.8	1023.4	85.6
51–A	11	32	39	100	8	90	1009.5	1025.4	108
51–C	–6	27	26	100	9	330	1010.5	1028.8	2.3
51–D	7	30	28	100	10	150	1013.2	1027.1	10.2
51–B	1	33	29	100	7	360	1011.5	1029.5	3
51–G	20	36	32	100	10	220	1012.2	1021.7	77
51–F	19	34	44	100	11	180	1006.8	1023	133.1
51–I	22	33	50	100	8	130	1012.9	1024	189.7
51–J	20	33	51	100	13	180	1006.8	1022	252
61–A	19	31	58	100	7	80	1004.1	1025.1	79.2
61–B	17	29	58	100	8	150	1013.5	1025.1	4.8
61–C	–3	28	26	100	10	350	1007.5	1032.2	242.1
51–L	–4	28	18	100	14	290	1006.8	1032.2	182.4
STS–26	21	34	38	100	9	45	N/A	N/A	380.7
STS–27	11	29	30	100	11	158	N/A	N/A	109.5
STS–29	0	29	19	97	11	338	N/A	N/A	85.9
STS–30	11	33	24	100	9	158	N/A	N/A	70.4
STS–28	22	36	40	97	8	315	N/A	N/A	109.7



Table 3. Meteorological parameter extremes (Continued).

Mission	Minimum Temperature (°C)	Maximum Temp. (°C)	Minimum Relative Humidity (%)	Maximum Relative Humidity (%)	Maximum Wind Speed (m/s)	Wind Direction (deg)	Minimum Sea Level Pressure (hPa)	Maximum Sea Level Pressure (hPa)	Total Precipitation (mm)
STS-34	19	34	40	94	9	338	N/A	N/A	352.6
STS-33	9	29	34	97	10	23	N/A	N/A	71.4
STS-32	-4	29	28	100	10	338	1013.9	1028.4	134.4
STS-36	8	29	30	100	11	330	1008.8	1034.9	114
STS-31	9	30	29	100	10	360	1005.8	1029.1	63
STS-41	18	35	43	100	8	60	1010.5	1022.4	57.4
STS-38	9	36	30	100	10	230	1006.8	1028.8	427.5
STS-35	9	35	30	100	17	200	1005.8	1028.8	521.2
STS-37	10	31	38	100	12	180	1005.8	1026.8	210.3
STS-39	1	32	19	100	15	180	998.6	1029.8	177.3
STS-40	17	33	45	100	8	280	1007.8	1023.7	164.6
STS-43	22	34	48	100	11	280	1012.5	1023.4	297.9
STS-48	21	34	42	100	8	240	1012.9	1021.3	88.1
STS-44	7	28	31	100	8	280	1013.2	1025.1	14.7
STS-42	0	26	31	100	9	40	1007.1	1035.9	49.8
STS-45	6	30	31	100	10	290	1007.5	1026.4	67.8
STS-49	6	31	22	100	10	290	1007.8	1027.5	148.6
STS-50	20	34	46	100	11	170	1007.8	1020	198.9
STS-46	20	36	38	100	10	160	1007.8	1024.4	251.2
STS-47	21	33	44	97	9	290	1014.6	1022.4	27.9
STS-52	15	31	46	100	10	230	1007.5	1028.8	155.4
STS-53	5	30	32	100	9	170	1012.2	1025.7	48.8
STS-54	3	28	33	100	10	300	1009.1	1027.1	69.1
STS-56	2	28	29	96	19	20	N/A	N/A	35.8
STS-55	-1	29	19	96	25	218	1009.1	1024	184.2
STS-57	18	34	33	96	14	46	1006.4	1023.7	14.2
STS-51	22	37	38	100	14	15	1012.9	1024.4	356.9
STS-58	18	33	32	93	20	33	1009.1	1021.3	114.6
STS-61	3	32	42	93	16	200	1005.4	1027.8	15.5
STS-60	4	27	38	96	16	187	1006.8	1032.5	86.1
STS-62	6	28	23	100	19	187	1002.7	1027.1	149.9
STS-59	14	30	34	93	17	17	1010.5	1026.1	20.1
STS-65	23	36	46	93	22	46	1013.9	1023.4	276.6
STS-64	22	33	50	93	10	121	1012.9	1022	63.2
STS-68	21	33	50	100	15	104	1010.5	1021.7	302.5
STS-66	16	32	44	96	19	45	1010.8	1023	206.5
STS-63	3	25	26	98	15	212	1006.8	1028.8	46.7
STS-67	0	26	22	97	17	17	1008.8	1029.5	27.4
STS-71	20	34	27	95	18	266	1005.8	1022.4	219.2
STS-70	20	34	44	99	19	267	1005.8	1022.4	294.6
STS-69	22	35	40	100	10	130	1006.1	1022.4	539.8
STS-73	22	34	57	100	19	153	1004.7	1020.7	398.8
STS-74	10	29	32	99	18	86	1005.8	1024.7	102.6
STS-72	-1	27	25	97	18	261	1005.1	1029.5	183.4

Table 3. Meteorological parameter extremes (Continued).

Mission	Minimum Temperature (°C)	Maximum Temp. (°C)	Minimum Relative Humidity (%)	Maximum Relative Humidity (%)	Maximum Wind Speed (m/s)	Wind Direction (deg)	Minimum Sea Level Pressure (hPa)	Maximum Sea Level Pressure (hPa)	Total Precipitation (mm)
STS-75	0	26	23	98	18	251	1008.1	1035.9	29.7
STS-76	2	29	27	98	25	345	1003.7	1030.5	237.2
STS-77	16	30	46	100	16	163	1012.5	1026.1	24.6
STS-78	20	32	58	99	15	68	1010.8	1022.4	219.5
STS-79	22	33	53	100	14	351	1005.8	1022	251.7
STS-80	11	29	32	99	20	56	1006.8	1031.1	15
STS-81	2	27	47	100	15	342	1006.8	1029.8	11.2
STS-82	1	26	25	100	16	348	1014.5	1029.8	11.2
STS-83	12	29	39	100	18	351	1005.4	1027.1	70.4
STS-84	15	30	49	100	19	244	1001.7	1025.1	59.2
STS-94	22	31	45	100	14	289	1009.5	1021.3	168.9
STS-85	23	31	64	98	14	194	1012.8	1020.6	150.9
STS-86	23	32	54	99	16	52	1009.1	1021.3	131.3
STS-87	9	29	37	99	18	224	1001	1027.4	73.2
STS-89	6	25	29	100	18	353	1003	1035.2	74.4
STS-90	9	30	30	100	18	256	1004.7	1031.8	5.6
STS-91	18	35	40	100	22	271	1004.7	1020.6	7.4
STS-95	18	32	53	100	18	5	1010.1	1025.4	60.2
STS-88	11	33	50	100	22	352	1000.6	1026.7	117.9
STS-96	11	31	49	100	18	197	1007.8	1022	43.2
STS-93	21	31	57	100	14	33	1014.2	1023.7	155.2
STS-103	6	27	47	100	16	16	1008.1	1030.1	120.9
STS-99	1	26	29	100	22	339	1001.7	1037.9	130.6
STS-101	9	31	34	99	20	351	1003.4	1027.8	54.6
STS-106	20	32	46	100	15	211	1008.4	1022.7	168.1
STS-92	18	32	57	99	21	45	1009.1	1023.7	185.9
STS-97	5	28	39	100	17	355	1011.5	1031.2	23.9
STS-98	1	27	26	100	15	358	1012.5	1030.1	7.1
STS-102	6	30	16	100	16	283	1009.1	1029.1	8.9
STS-100	9	29	29	98	18	2	1009.1	1027.8	46
STS-104	21	32	51	96	16	54	1011.8	1026.4	54.6
STS-105	22	32	60	100	16	180	1009.8	1024	115.1
STS-108	15	25	52	100	26	355	1007.8	1027.1	143.3
STS-109	4	25	24	100	24	345	1007.8	1028.4	97.3
STS-110	13	28	34	99	15	253	1011.5	1027.1	29.5
STS-111	20	32	44	100	18	1	1008.4	1025.7	31.8
STS-112	23	32	50	100	15	160	1009.1	1021	14.7
STS-113	7	30	35	100	18	269	1004.7	1028.4	58.7
STS-107	4	25	39	100	18	352	1007.4	1029.1	314.5

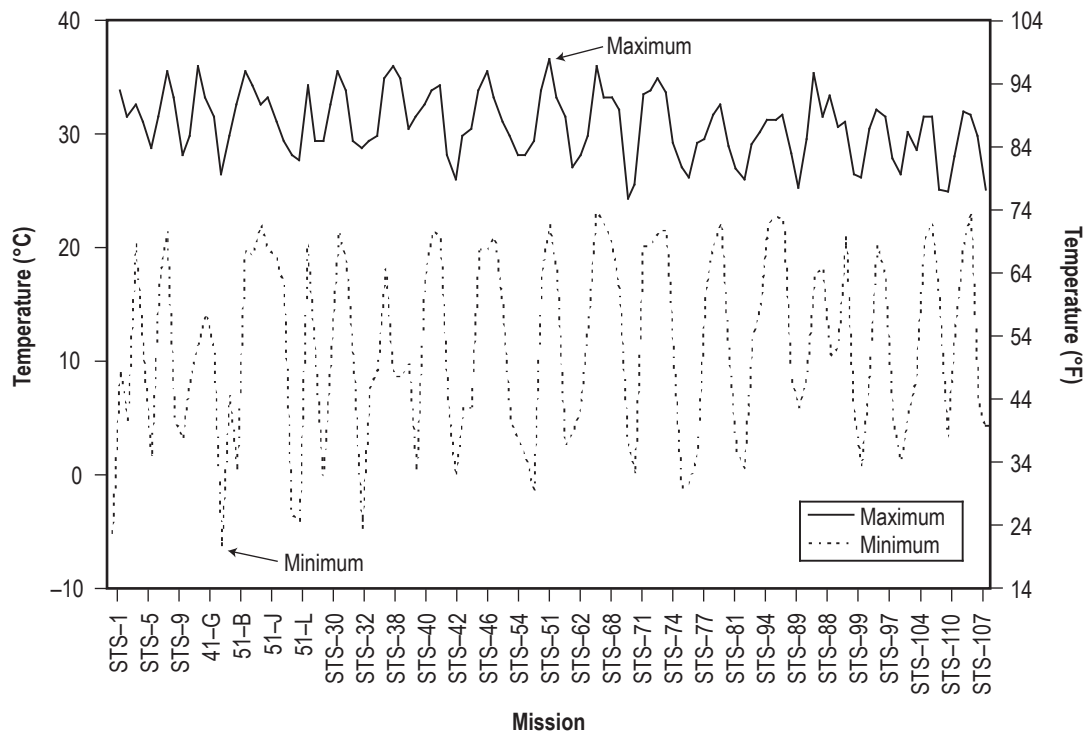


Figure 2. Temperature extremes for all pad exposure periods: Overall maximum temperature was 37 °C (98 °F) on STS-51 and overall minimum temperature was -6 °C (21 °F) on 51-C.

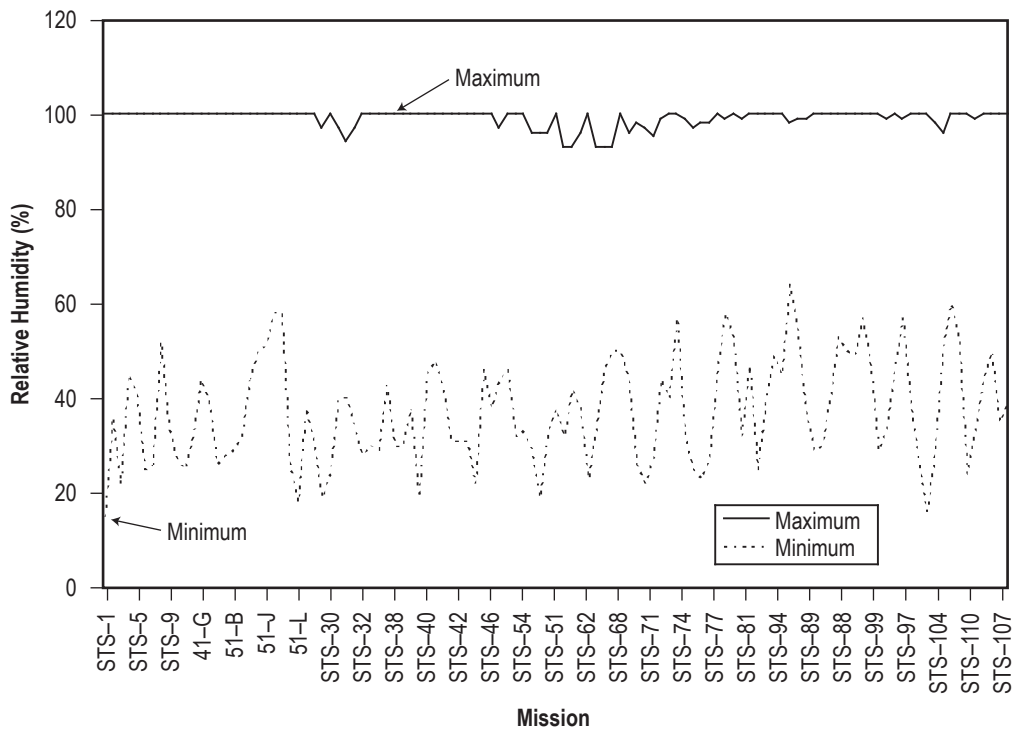


Figure 3. Relative humidity extremes for all pad exposure periods: Overall maximum relative humidity was 100 percent on various missions, and overall minimum relative humidity was 13 percent on STS-1.

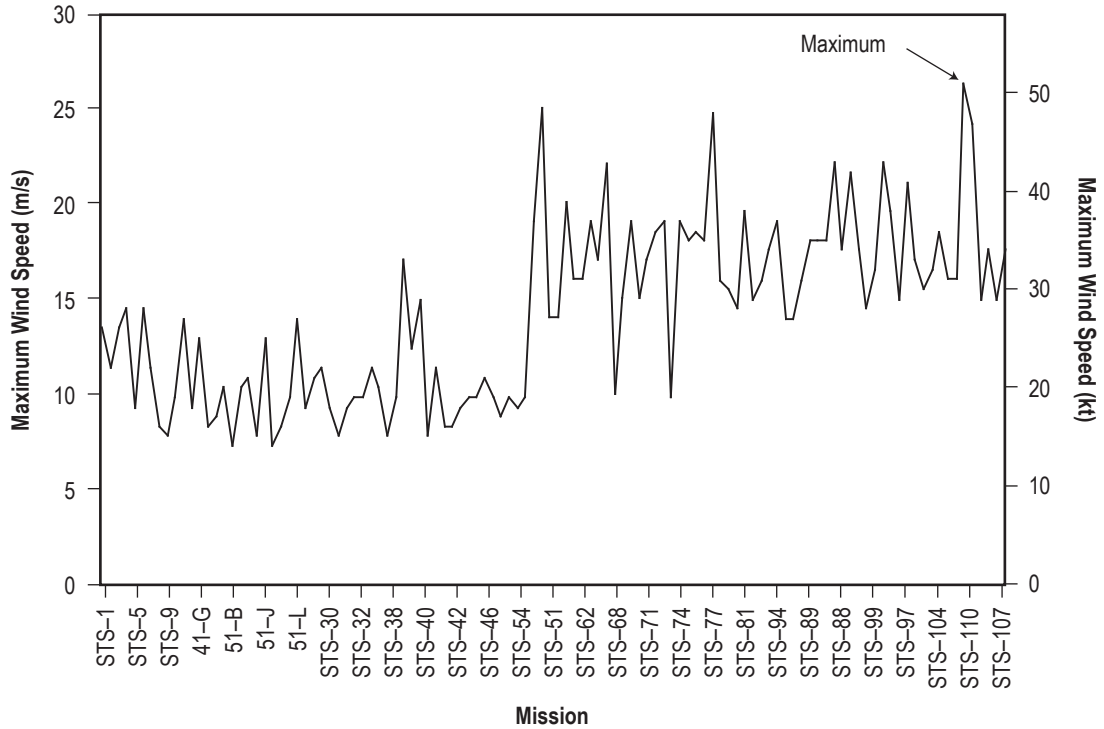


Figure 4. Wind speed for all pad exposure periods: Overall maximum wind speed was 26 m/s (51 kt), 355 deg, on STS-108.

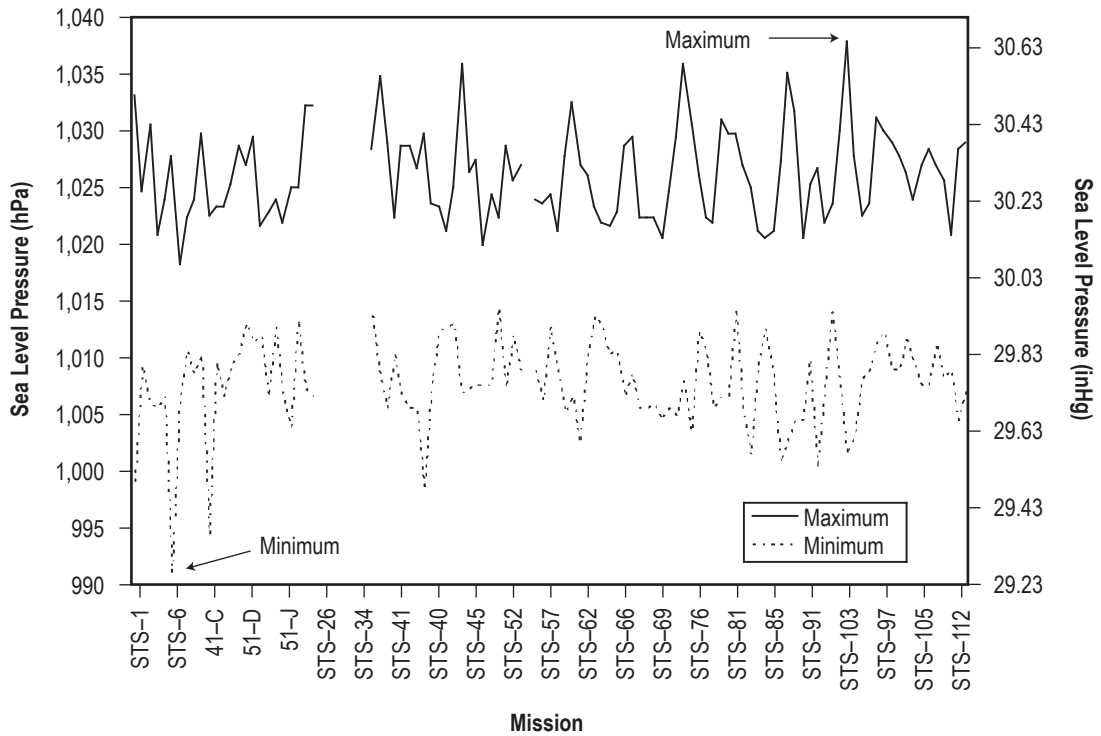


Figure 5. Sea level pressure extremes for all pad exposure periods: Overall maximum pressure was 1,037.9 hPa (30.65 inHg) on STS-99 and overall minimum pressure was 991.4 hPa (29.28 inHg) on STS-6.

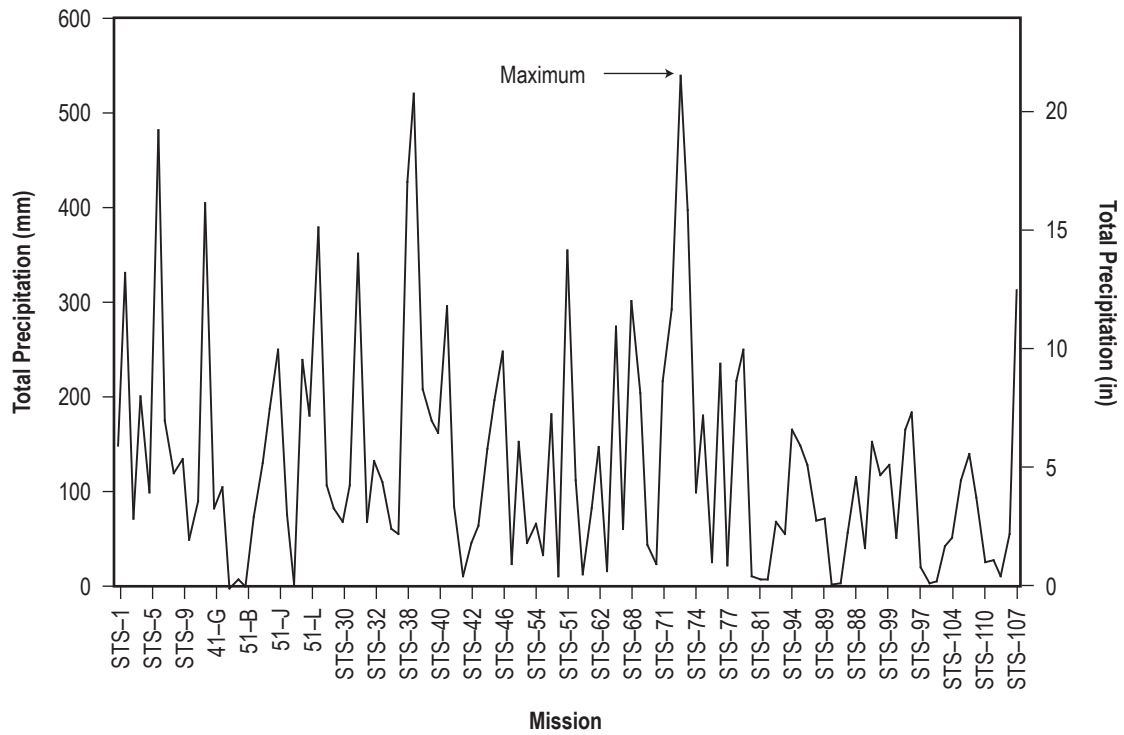


Figure 6. Total precipitation for all pad exposure periods: Overall maximum precipitation was 539.8 mm (21.25 in) on STS-69.

## 5. PAD EXPOSURE PERIOD METEOROLOGICAL PARAMETERS BY MISSION

Section 5 contains plots of temperature, relative humidity, wind speed, wind direction, pressure, and precipitation for each STS mission in chronological order. Missing data are represented by gaps in the parameter curves. Section 5 also contains extremes for these parameters as well as a summary of conditions at launch. For the early STS missions, pad exposure period data were only available from the hourly surface observation sites. For later missions, the tower data became available. For those missions that had multiple data sources available, proximity to the launch pad and completeness of the data determined the data source to be used. The archived data available for each mission is given in sections 5.1 through 5.113.

The STS mission chronology is shown in table 4. The On Date column is the date the vehicle reached the pad. The Off Date/Time column is the date and time (coordinated universal time (UTC)) the vehicle left the pad. The time (UTC) and date of the beginning of tanking is shown in the Tanking Start column. The Tanking Start column is not applicable for rollback. Local standard time at KSC is obtained by subtracting 5 hr from UTC.

Table 4. STS mission chronology.

Mission	Event*	Orbiter	External Tank	Launch Pad	On Date	Off Date/Time (UTC)	Tanking Start (UTC)
STS-1	L	OV-102	ET-2	39A	1980.12.29	1981.04.12 12:00	1981.04.12 03:30
STS-2	L	OV-102	ET-3	39A	1981.08.31	1981.11.12 15:10	1981.11.12 07:00
STS-3	L	OV-102	ET-4	39A	1982.02.16	1982.03.22 16:00	1982.03.22 07:00
STS-4	L	OV-102	ET-5	39A	1982.05.26	1982.06.27 15:00	1982.06.27 07:00
STS-5	L	OV-102	ET-6	39A	1982.09.21	1982.11.11 12:19	1982.11.11 04:30
STS-6	L	OV-99	ET-8	39A	1982.11.30	1983.04.04 18:30	1983.04.04 09:30
STS-7	L	OV-99	ET-7	39A	1983.05.26	1983.06.18 11:33	1983.06.18 04:13
STS-8	L	OV-99	ET-9	39A	1983.08.02	1983.08.30 06:32	1983.08.29 22:00
STS-9	R	OV-102	ET-11	39A	1983.09.28	1983.10.19 22:00	N/A
STS-9	L	OV-102	ET-11	39A	1983.11.08	1983.11.28 16:00	1983.11.29 03:40
41-B	L	OV-99	ET-10	39A	1984.01.12	1984.02.03 13:00	1984.02.03 04:45
41-C	L	OV-99	ET-12	39A	1984.03.19	1984.04.06 13:58	1984.04.06 00:38
41-D	R	OV-103	ET-13	39A	1984.05.19	1984.07.14 22:00	N/A
41-D	L	OV-103	ET-13	39A	1984.08.09	1984.08.30 12:42	1984.08.30 04:15
41-G	L	OV-99	ET-15	39A	1984.09.13	1984.10.05 11:03	1984.10.05 02:43
51-A	L	OV-103	ET-16	39A	1984.10.23	1984.11.08 12:15	1984.11.08 04:58
51-C	L	OV-103	ET-14	39A	1985.01.05	1985.01.24 19:50	1985.01.23 09:55
51-D	L	OV-103	ET-18	39A	1985.03.28	1985.04.12 13:59	1985.04.12 05:00
51-B	R	OV-99	ET-17	39A	1985.02.15	1985.03.04 23:00	N/A
51-B	L	OV-99	ET-17	39A	1985.04.15	1985.04.29 16:02	1985.04.29 07:40
51-G	L	OV-103	ET-20	39A	1985.06.04	1985.06.17 11:33	1985.06.17 03:13

\* How the vehicle left the pad: L = launch, R = rollback, and S = second rollback.

Table 4. STS mission chronology (Continued).

Mission	Event*	Orbiter	External Tank	Launch Pad	On Date	Off Date/Time (UTC)	Tanking Start (UTC)
51-F	L	OV-99	ET-19	39A	1985.06.29	1985.07.29 21:00	1985.07.29 10:28
51-I	L	OV-103	ET-21	39A	1985.08.06	1985.08.27 10:58	1985.08.27 03:00
51-J	L	OV-104	ET-25	39A	1985.08.30	1985.10.03 15:15	1985.10.03 06:00
61-A	L	OV-99	ET-24	39A	1985.10.16	1985.10.30 17:00	1985.10.30 08:40
61-B	L	OV-104	ET-22	39A	1985.11.12	1985.11.27 00:29	1985.11.26 16:09
61-C	L	OV-102	ET-30	39A	1985.12.02	1986.01.12 11:55	1986.01.12 03:35
51-L	L	OV-99	ET-26	39B	1985.12.22	1986.01.28 16:38	1986.01.28 09:18
STS-26	L	OV-103	ET-28	39B	1988.07.04	1988.09.29 15:37	1988.09.29 05:39
STS-27	L	OV-104	ET-23	39B	1988.11.02	1988.12.02 14:31	1988.12.02 03:20
STS-29	L	OV-103	ET-36	39B	1989.02.03	1989.03.13 14:57	1989.03.13 04:50
STS-30	L	OV-104	ET-29	39B	1989.03.22	1989.05.04 18:47	1989.05.04 09:28
STS-28	L	OV-102	ET-31	39B	1989.07.14	1989.08.08 12:37	1989.08.08 03:10
STS-34	L	OV-104	ET-27	39B	1989.08.29	1989.10.18 16:54	1989.10.18 08:07
STS-33	L	OV-103	ET-38	39B	1989.10.27	1989.11.23 00:23	1989.11.22 15:10
STS-32	L	OV-102	ET-32	39A	1989.11.28	1990.01.09 12:35	1990.01.09 02:50
STS-36	L	OV-104	ET-33	39A	1990.01.25	1990.02.28 07:50	1990.02.27 23:40
STS-31	L	OV-103	ET-34	39B	1990.03.15	1990.04.24 12:34	1990.04.24 04:11
STS-41	L	OV-103	ET-39	39B	1990.09.04	1990.10.06 11:47	1990.10.06 03:15
STS-38	R	OV-104	ET-40	39A	1990.06.18	1990.08.09 22:00	N/A
STS-38	L	OV-104	ET-40	39A	1990.10.12	1990.11.15 23:48	1990.11.15 15:10
STS-35	R	OV-102	ET-35	39A	1990.04.22	1990.06.12 22:00	N/A
STS-35	S	OV-102	ET-35	39A	1990.08.09	1990.10.09 22:00	N/A
STS-35	L	OV-102	ET-35	39B	1990.10.14	1990.12.02 06:49	1990.12.01 22:08
STS-37	L	OV-104	ET-37	39B	1991.03.15	1991.04.05 14:23	1991.04.05 05:58
STS-39	R	OV-103	ET-46	39A	1991.02.15	1991.03.07 23:00	N/A
STS-39	L	OV-103	ET-46	39A	1991.04.01	1991.04.28 11:33	1991.04.28 02:41
STS-40	L	OV-102	ET-41	39B	1991.05.02	1991.06.05 13:25	1991.06.05 03:40
STS-43	L	OV-104	ET-47	39A	1991.06.25	1991.08.02 15:02	1991.08.02 06:41
STS-48	L	OV-103	ET-42	39A	1991.08.12	1991.09.12 23:11	1991.09.12 14:37
STS-44	L	OV-104	ET-53	39A	1991.10.23	1991.11.24 23:44	1991.11.24 15:11
STS-42	L	OV-103	ET-32	39A	1991.12.19	1992.01.22 14:53	1992.01.22 05:33
STS-45	L	OV-104	ET-44	39A	1992.02.19	1992.03.24 13:13	1992.03.24 04:10
STS-49	L	OV-105	ET-43	39B	1992.03.13	1992.05.07 23:40	1992.05.07 14:16
STS-50	L	OV-102	ET-45	39A	1992.06.03	1992.06.25 16:12	1992.06.25 07:47
STS-46	L	OV-104	ET-50	39B	1992.06.11	1992.07.31 13:57	1992.07.31 05:36
STS-47	L	OV-105	ET-49	39B	1992.08.25	1992.09.12 14:23	1992.09.12 06:03
STS-52	L	OV-102	ET-55	39B	1992.09.26	1992.10.22 17:10	1992.10.22 06:56
STS-53	L	OV-103	ET-49	39A	1992.11.08	1992.12.02 13:24	1992.12.02 03:39
STS-54	L	OV-105	ET-51	39B	1992.12.03	1993.01.13 13:59	1993.01.13 05:32
STS-56	L	OV-103	ET-54	39B	1993.03.15	1993.04.08 05:29	1993.04.07 20:10
STS-55	L	OV-102	ET-56	39A	1993.02.08	1993.04.26 14:50	1993.04.26 06:30
STS-57	L	OV-105	ET-58	39B	1993.04.28	1993.06.21 13:07	1993.06.21 04:47
STS-51	L	OV-103	ET-59	39B	1993.06.26	1993.09.12 11:45	1993.09.12 03:25
STS-58	L	OV-102	ET-57	39B	1993.09.17	1993.10.18 14:53	1993.10.18 06:33
STS-61	L	OV-105	ET-60	39B	1993.10.28	1993.12.02 09:26	1993.12.02 01:07
STS-60	L	OV-103	ET-61	39A	1994.01.10	1994.02.03 12:10	1994.02.03 03:50
STS-62	L	OV-102	ET-62	39B	1994.02.10	1994.03.04 13:53	1994.03.04 05:33

\* How the vehicle left the pad: L=launch, R=rollback, and S=second rollback.

Table 4. STS mission chronology (Continued).

Mission	Event*	Orbiter	External Tank	Launch Pad	On Date	Off Date/Time (UTC)	Tanking Start (UTC)
STS-59	L	OV-105	ET-63	39A	1994.03.19	1994.04.09 11:05	1994.04.10 02:45
STS-65	L	OV-102	ET-64	39A	1994.06.15	1994.07.08 16:43	1994.07.08 08:23
STS-64	L	OV-103	ET-66	39B	1994.08.19	1994.09.09 22:23	1994.09.09 12:10
STS-68	R	OV-105	ET-65	39A	1994.07.27	1994.08.24 22:00	N/A
STS-68	L	OV-105	ET-65	39A	1994.09.13	1994.09.30 11:16	1994.09.30 02:56
STS-66	L	OV-104	ET-67	39B	1994.10.09	1994.11.03 17:00	1994.11.03 08:36
STS-63	L	OV-103	ET-68	39B	1995.01.10	1995.02.03 05:22	1995.02.02 20:31
STS-67	L	OV-105	ET-69	39A	1995.02.08	1995.03.02 06:38	1995.03.01 22:17
STS-71	L	OV-104	ET-70	39A	1995.04.26	1995.06.27 19:32	1995.06.27 10:12
STS-70	R	OV-103	ET-71	39B	1995.05.11	1995.06.08 22:00	N/A
STS-70	L	OV-103	ET-71	39B	1995.06.15	1995.07.13 13:42	1995.07.13 05:21
STS-69	R	OV-105	ET-72	39A	1995.07.05	1995.08.01 22:00	N/A
STS-69	L	OV-105	ET-72	39A	1995.08.08	1995.09.07 15:09	1995.09.07 06:49
STS-73	L	OV-102	ET-73	39B	1995.08.28	1995.10.20 13:53	1995.10.20 05:30
STS-74	L	OV-104	ET-74	39A	1995.10.12	1995.11.12 12:31	1995.11.12 03:48
STS-72	L	OV-105	ET-75	39B	1995.12.06	1996.01.11 09:41	1996.01.11 00:58
STS-75	L	OV-102	ET-76	39B	1996.01.29	1996.02.22 20:18	1996.02.22 11:58
STS-76	L	OV-104	ET-77	39B	1996.02.28	1996.03.22 08:13	1996.03.21 22:52
STS-77	L	OV-105	ET-78	39B	1996.04.16	1996.05.19 10:30	1996.05.19 01:40
STS-78	L	OV-102	ET-79	39B	1996.05.30	1996.06.20 14:49	1996.06.20 05:59
STS-79	R	OV-104	ET-82	39A	1996.07.01	1996.07.10 22:00	N/A
STS-79	S	OV-104	ET-82	39A	1996.08.20	1996.09.04 22:00	N/A
STS-79	L	OV-104	ET-82	39A	1996.09.05	1996.09.16 08:55	1996.09.15 23:33
STS-80	L	OV-102	ET-80	39B	1996.10.16	1996.11.19 19:56	1996.11.19 11:03
STS-81	L	OV-104	ET-83	39B	1996.12.10	1997.01.12 09:27	1997.01.13 00:37
STS-82	L	OV-103	ET-81	39A	1997.01.17	1997.02.11 08:55	1997.02.11 00:04
STS-83	L	OV-102	ET-84	39A	1997.03.11	1997.04.04 19:21	1997.04.04 10:40
STS-84	L	OV-104	ET-85	39A	1997.04.24	1997.05.15 08:08	1997.05.14 22:47
STS-94	L	OV-102	ET-86	39A	1997.06.11	1997.07.01 18:02	1997.07.01 09:30
STS-85	L	OV-103	ET-87	39A	1997.07.14	1997.08.07 14:41	1997.08.07 05:51
STS-86	L	OV-104	ET-88	39A	1997.08.18	1997.09.26 02:34	1997.09.25 17:39
STS-87	L	OV-102	ET-89	39B	1997.10.29	1997.11.19 19:46	1997.11.19 11:26
STS-89	L	OV-105	ET-90	39A	1997.12.19	1998.01.23 02:48	1998.01.22 17:52
STS-90	L	OV-102	ET-91	39B	1998.03.23	1998.04.17 18:19	1998.04.17 09:29
STS-91	L	OV-103	ET-96	39A	1998.05.02	1998.06.02 22:06	1998.06.02 13:14
STS-95	L	OV-103	ET-98	39B	1998.09.21	1998.10.29 19:20	1998.10.29 10:40
STS-88	L	OV-105	ET-97	39A	1998.10.21	1998.12.04 08:36	1998.12.03 23:10
STS-96	R	OV-103	ET-100	39B	1999.04.23	1999.05.16 22:00	N/A
STS-96	L	OV-103	ET-100	39B	1999.05.20	1999.05.27 10:50	1999.05.27 01:54
STS-93	L	OV-102	ET-99	39B	1999.06.07	1999.07.23 04:31	1999.07.22 18:54
STS-103	L	OV-103	ET-101	39B	1999.11.13	1999.12.20 00:50	1999.12.19 15:30
STS-99	L	OV-105	ET-92	39A	1999.12.13	2000.02.11 17:43	2000.02.11 09:10
STS-101	L	OV-104	ET-102	39A	2000.03.25	2000.05.19 10:11	2000.05.19 01:17
STS-106	L	OV-104	ET-103	39B	2000.08.13	2000.09.08 12:46	2000.09.08 03:50
STS-92	L	OV-103	ET-104	39A	2000.09.11	2000.10.11 23:17	2000.10.11 13:52

\* How the vehicle left the pad: L=launch, R=rollback, and S=second rollback.



Table 4. STS mission chronology (Continued).

<b>Mission</b>	<b>Event*</b>	<b>Orbiter</b>	<b>External Tank</b>	<b>Launch Pad</b>	<b>On Date</b>	<b>Off Date/Time (UTC)</b>	<b>Tanking Start (UTC)</b>
STS-97	L	OV-105	ET-105	39B	2000.10.31	2000.12.01 03:06	2000.11.30 18:10
STS-98	R	OV-104	ET-106	39A	2001.01.03	2001.01.19 23:00	N/A
STS-98	L	OV-104	ET-106	39A	2001.01.26	2001.02.07 23:13	2001.02.07 14:16
STS-102	L	OV-103	ET-107	39B	2001.02.12	2001.03.08 11:42	2001.03.08 02:17
STS-100	L	OV-105	ET-108	39A	2001.03.22	2001.04.19 18:41	2001.04.09 09:45
STS-104	L	OV-104	ET-109	39B	2001.06.21	2001.07.12 09:04	2001.07.12 00:08
STS-105	L	OV-103	ET-110	39A	2001.07.02	2001.08.10 21:10	2001.08.10 11:50
STS-108	L	OV-105	ET-111	39B	2001.10.31	2001.12.05 22:19	2001.12.05 12:54
STS-109	L	OV-102	ET-112	39A	2002.01.28	2002.03.01 11:22	2002.03.01 02:01
STS-110	L	OV-104	ET-114	39B	2002.03.12	2002.04.08 20:44	2002.04.08 11:14
STS-111	L	OV-105	ET-113	39A	2002.04.29	2002.06.05 21:23	2002.06.05 11:57
STS-112	L	OV-104	ET-115	39B	2002.09.10	2002.10.07 19:46	2002.10.07 10:50
STS-113	L	OV-105	ET-116	39A	2002.10.12	2002.11.24 00:50	2002.11.23 16:20
STS-107	L	OV-102	ET-93	39A	2002.12.09	2003.01.16 15:39	2003.01.16 07:19

\* How the vehicle left the pad: L=launch, R=rollback, and S=second rollback.

## 5.1 STS-1

STS-1 was the first mission for *Columbia* (OV-102). It rolled out to pad 39A on December 29, 1980. STS-1 was exposed on the pad for 105 days and launched on April 12, 1981, at 12:00 UTC.

### 5.1.1 STS-1 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-1.

### 5.1.2 STS-1 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-1 are shown in table 5. Temperature and relative humidity were measured at pad 39A, camera site 3 at 1.2 m (4 ft) ANG. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 5.

Table 5. STS-1 L-0 surface observations.

Temperature	21.1 °C (70 °F)
Relative humidity	82%
Sea level pressure	1,023.7 hPa (30.23 inHg)
Wind speed	3.6 m/s (7 kt) (1-min average)
Wind direction	125° (1-min average)
Sky condition	4/8 cirrus at 10,363 m (34,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.1.3 STS-1 Pad Exposure Period Surface Meteorological Parameters

Figures 7–12 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-1 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 6. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 6. STS-1 pad exposure period hourly extremes.

Minimum temperature	–5 °C (23 °F)
Maximum temperature	30.6 °C (87 °F)
Minimum relative humidity	13%
Maximum relative humidity	100%
Minimum sea level pressure	999.3 hPa (29.51 inHg)
Maximum sea level pressure	1,033.2 hPa (30.51 inHg)
Maximum wind speed and associated wind direction	13.4 m/s (26 kt) 290°
Total precipitation	152.1 mm (5.99 in)

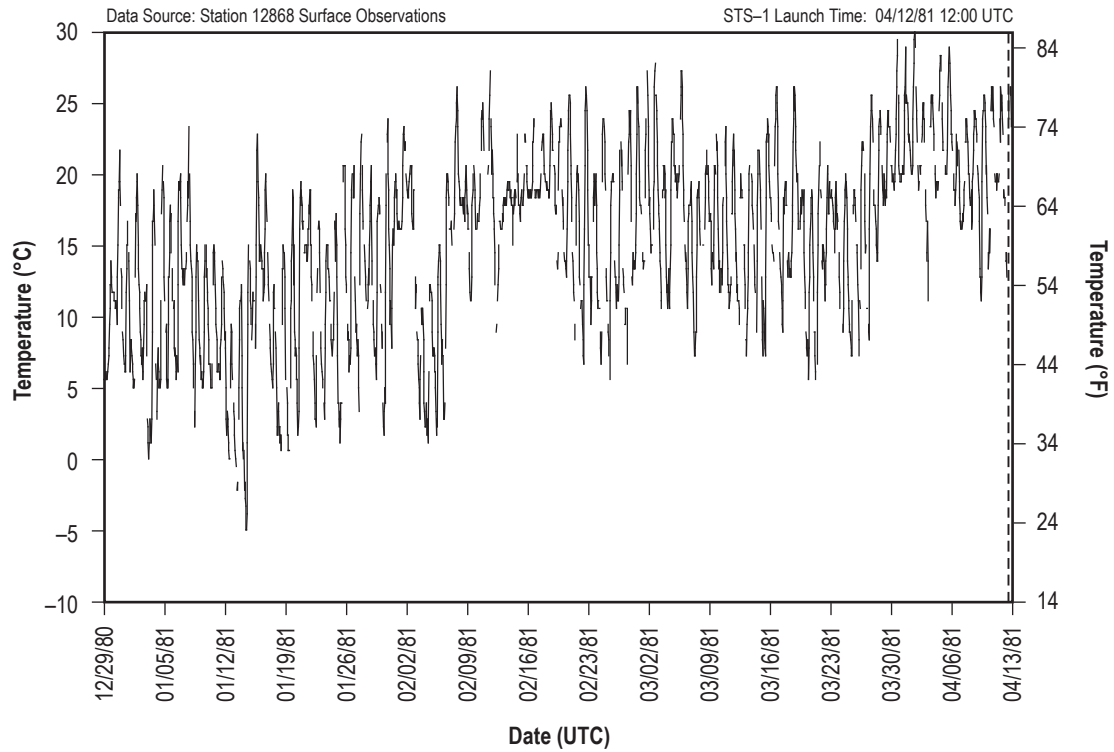


Figure 7. STS-1 hourly surface temperature.

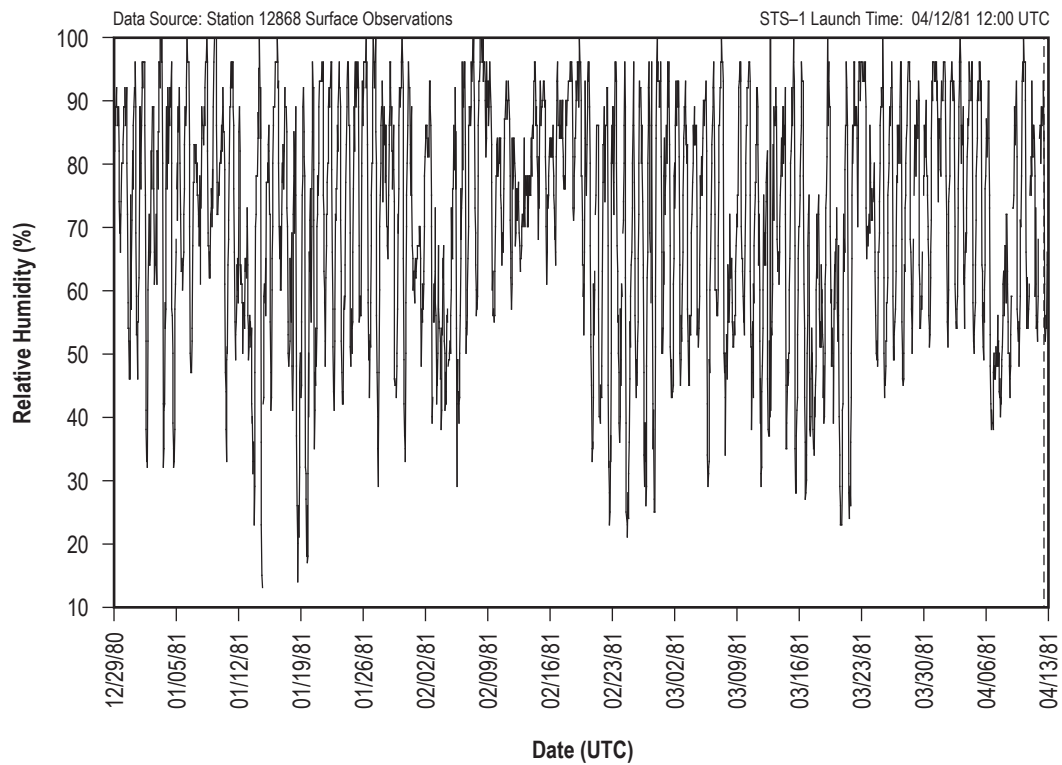


Figure 8. STS-1 hourly surface relative humidity.

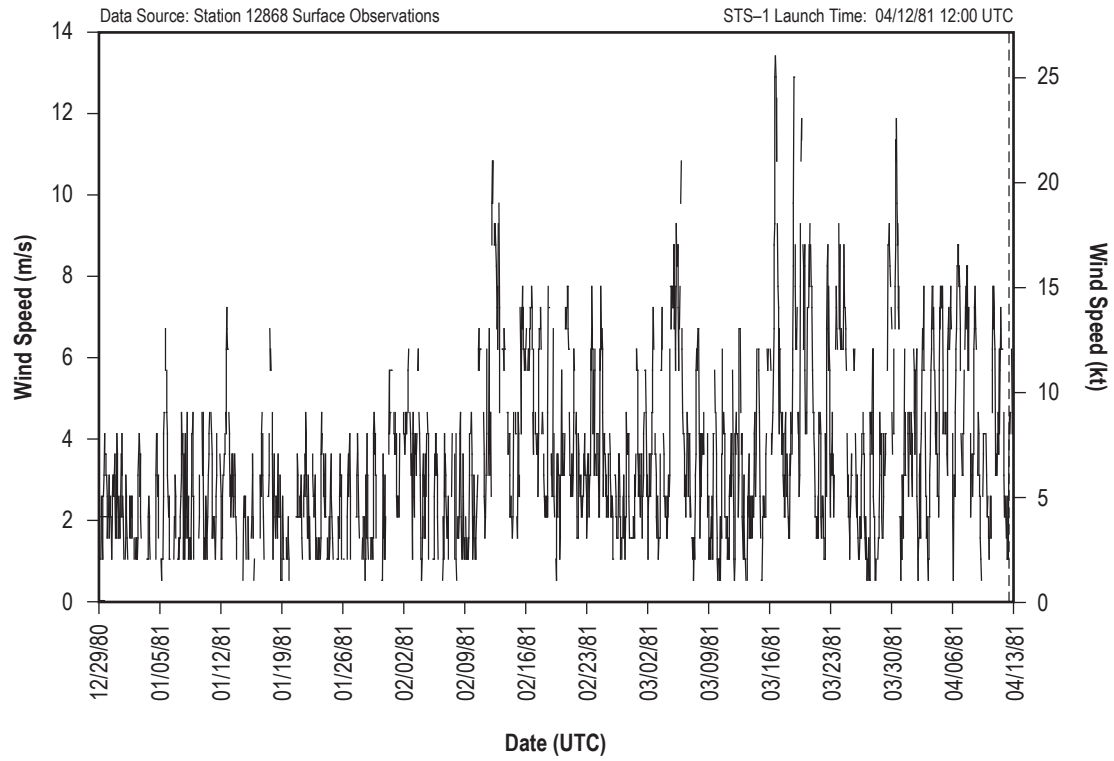


Figure 9. STS-1 hourly surface wind speed.

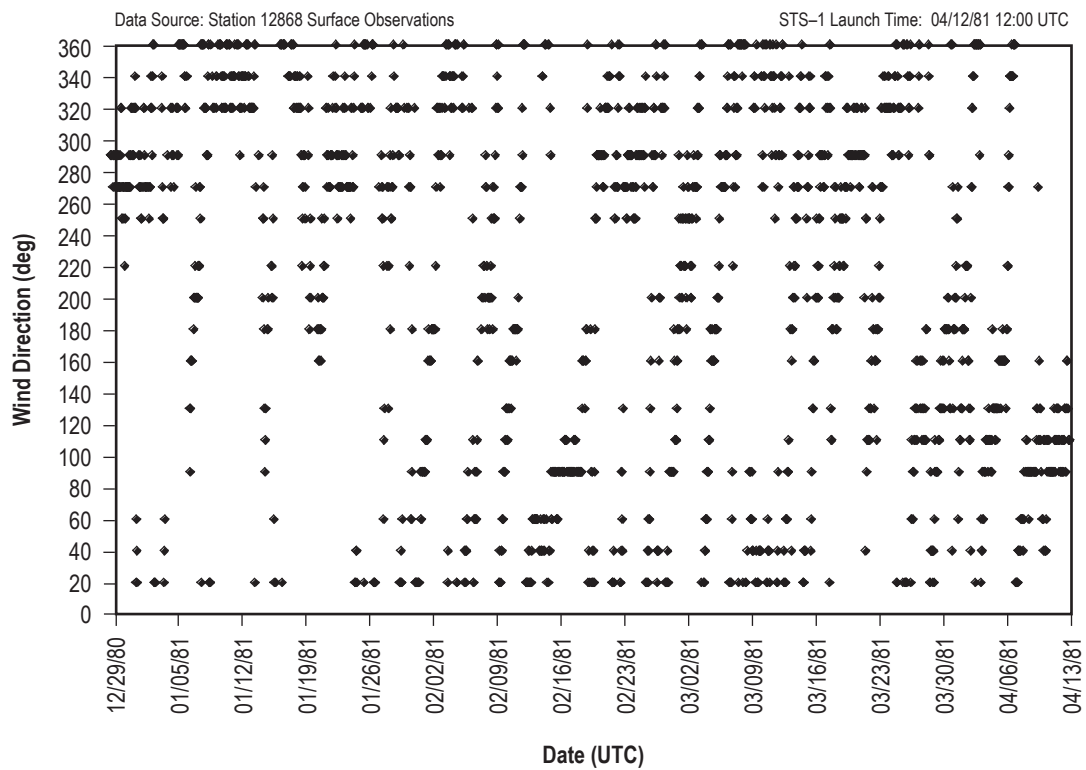


Figure 10. STS-1 hourly surface wind direction.

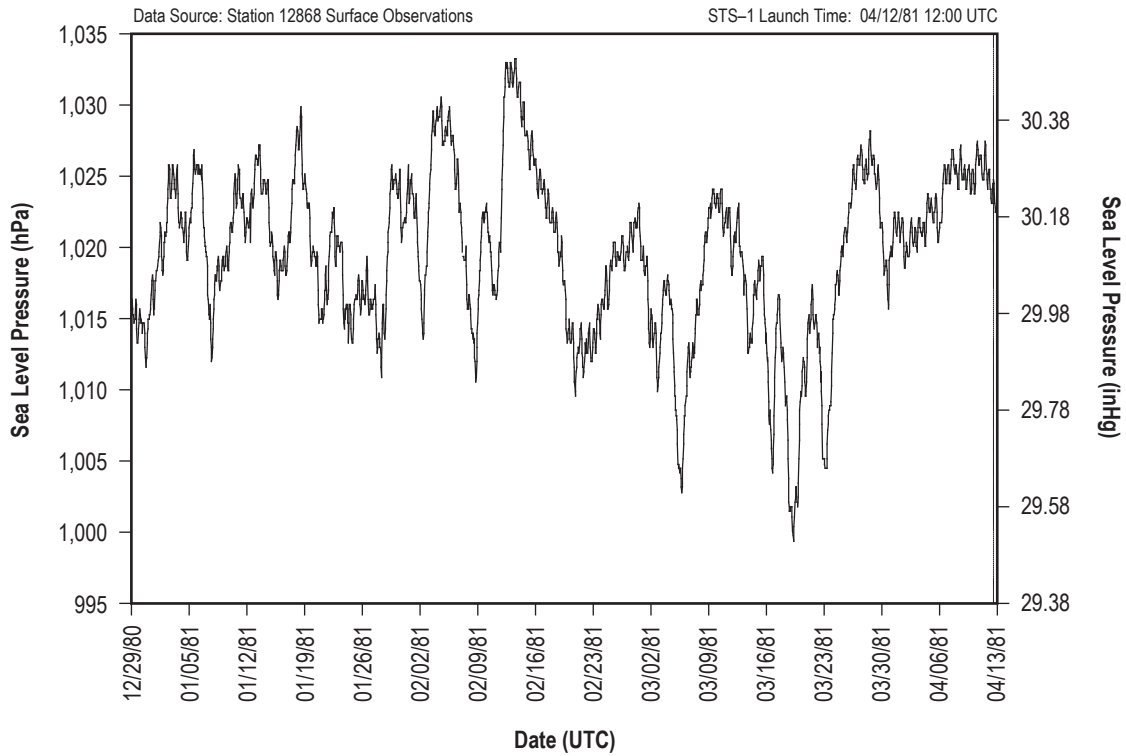


Figure 11. STS-1 hourly sea level pressure.

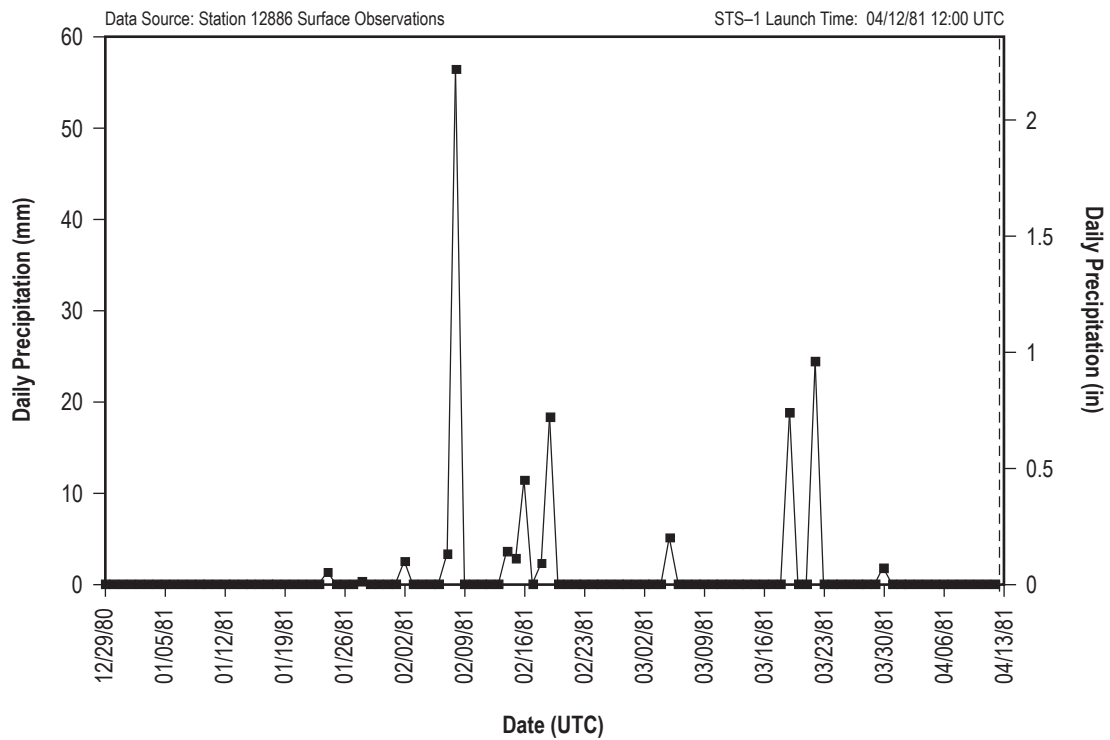


Figure 12. STS-1 daily precipitation totals.

## 5.2 STS-2

STS-2 was the second mission for *Columbia* (OV-102). It rolled out to pad 39A on August 31, 1981. STS-2 was exposed on the pad for 74 days and launched on November 12, 1981, at 15:10 UTC.

### 5.2.1 STS-2 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-2.

### 5.2.2 STS-2 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-2 are shown in table 7. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 7.

Table 7. STS-2 L-0 surface observations.

Temperature	22.8 °C (73 °F)
Relative humidity	61%
Sea level pressure	1,016.9 hPa (30.03 inHg)
Wind speed	8.2 m/s (16 kt) (1-min average)
Wind direction	345° (1-min average)
Sky condition	1/8 stratocumulus at 671 m (2,201 ft)
Visibility	13 km (7 nmi)

### 5.2.3 STS-2 Pad Exposure Period Surface Meteorological Parameters

Figures 13–18 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-2 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 8. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 8. STS-2 pad exposure period hourly extremes.

Minimum temperature	9.4 °C (49 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	36%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.5 hPa (29.81 inHg)
Maximum sea level pressure	1,024.7 hPa (30.26 inHg)
Maximum wind speed and associated wind direction	11.3 m/s (22 kt) 360°
Total precipitation	332.7 mm (13.10 in)

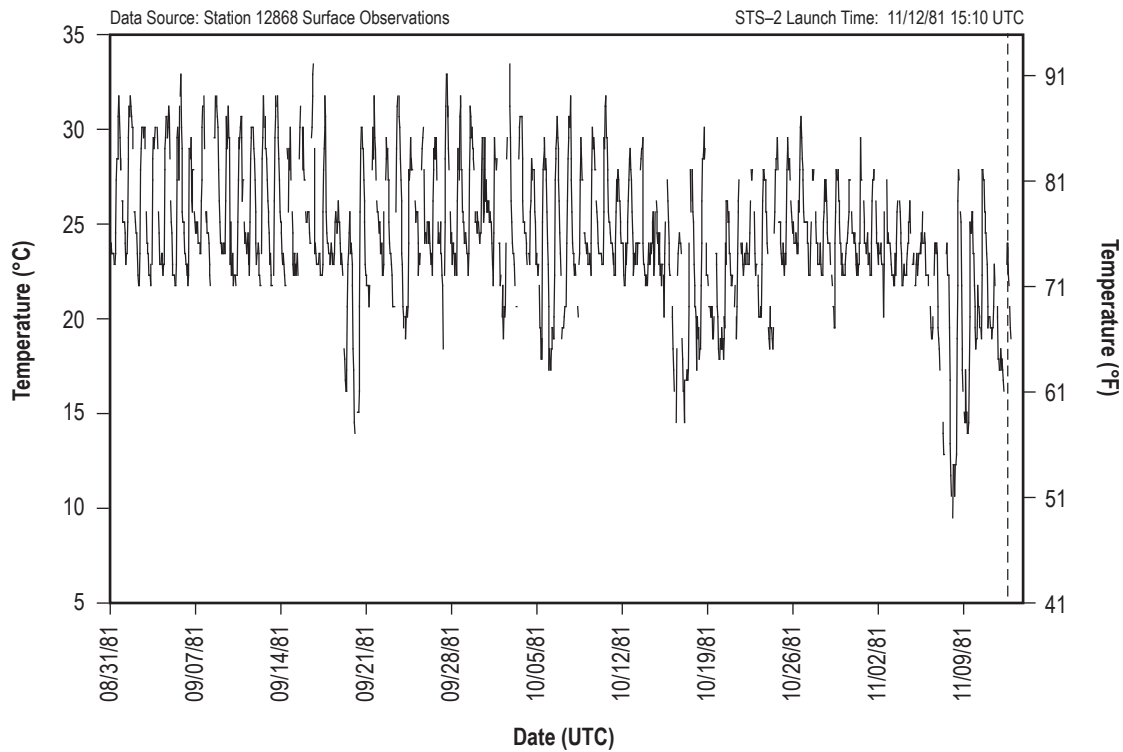


Figure 13. STS-2 hourly surface temperature.

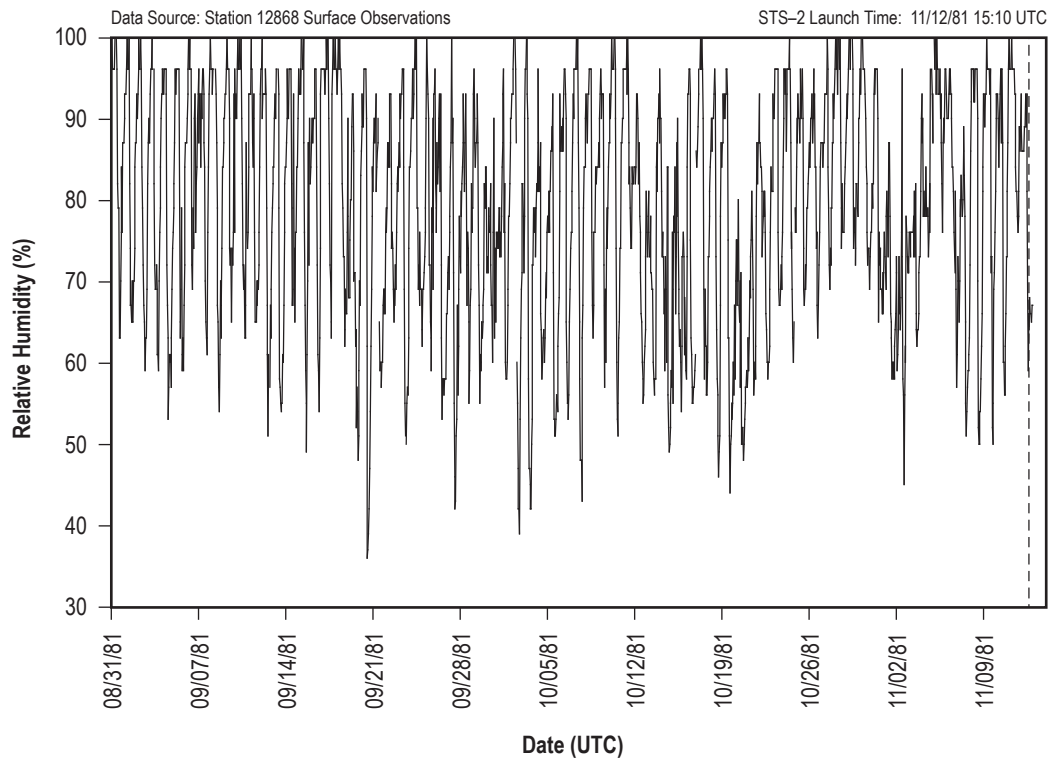


Figure 14. STS-2 hourly surface relative humidity.

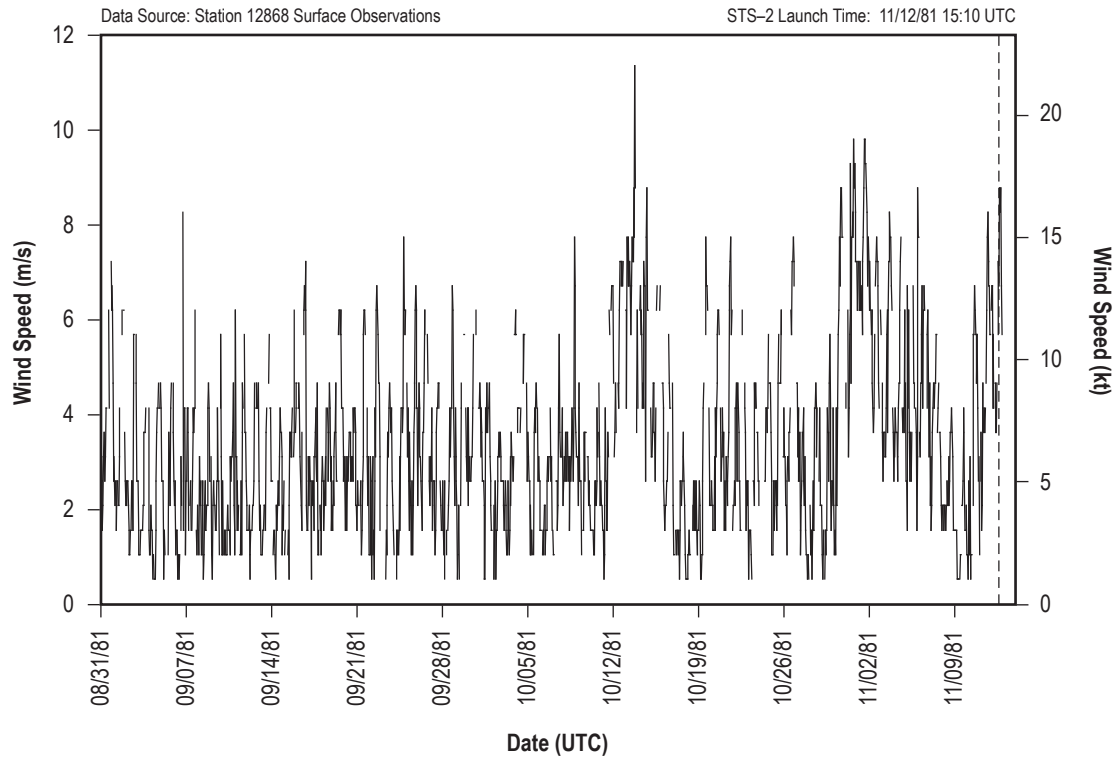


Figure 15. STS-2 hourly surface wind speed.

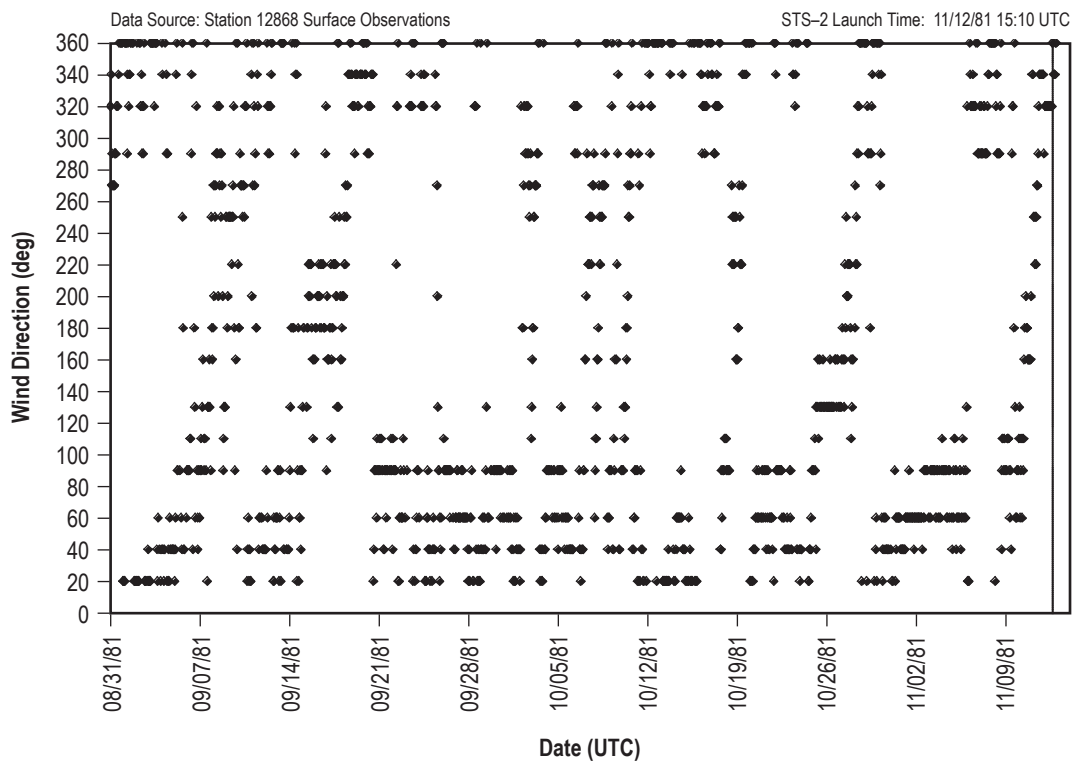


Figure 16. STS-2 hourly surface wind direction.



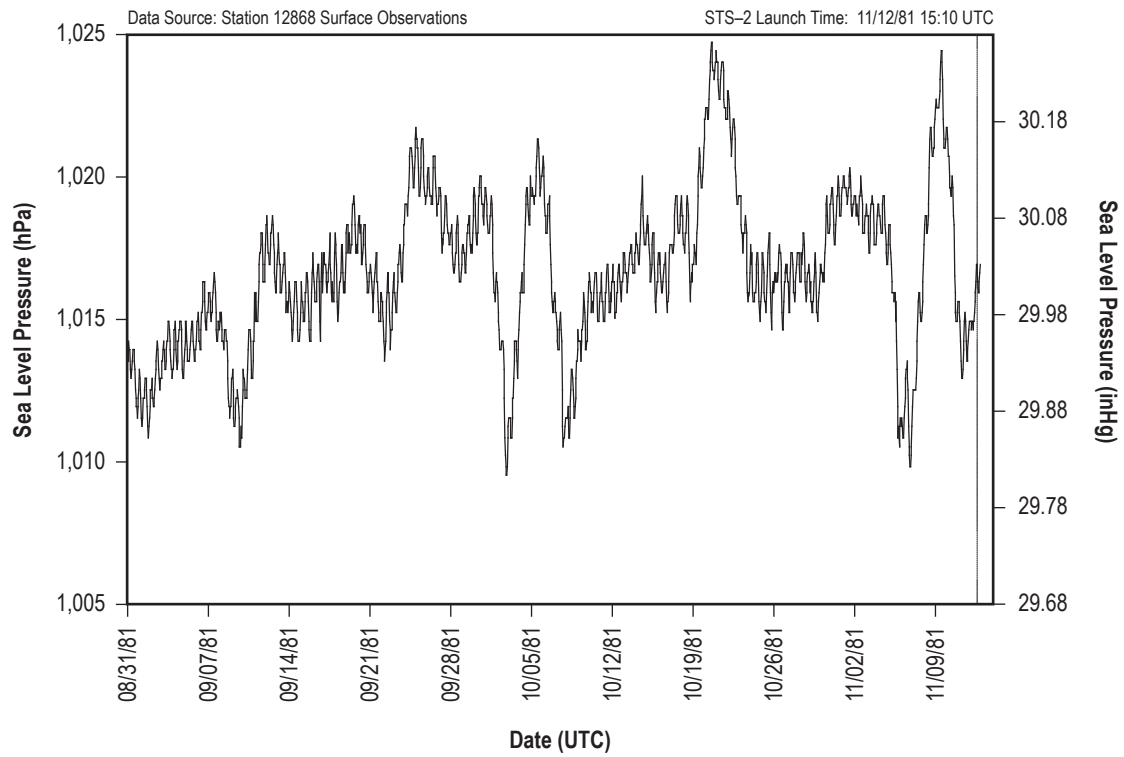


Figure 17. STS-2 hourly sea level pressure.

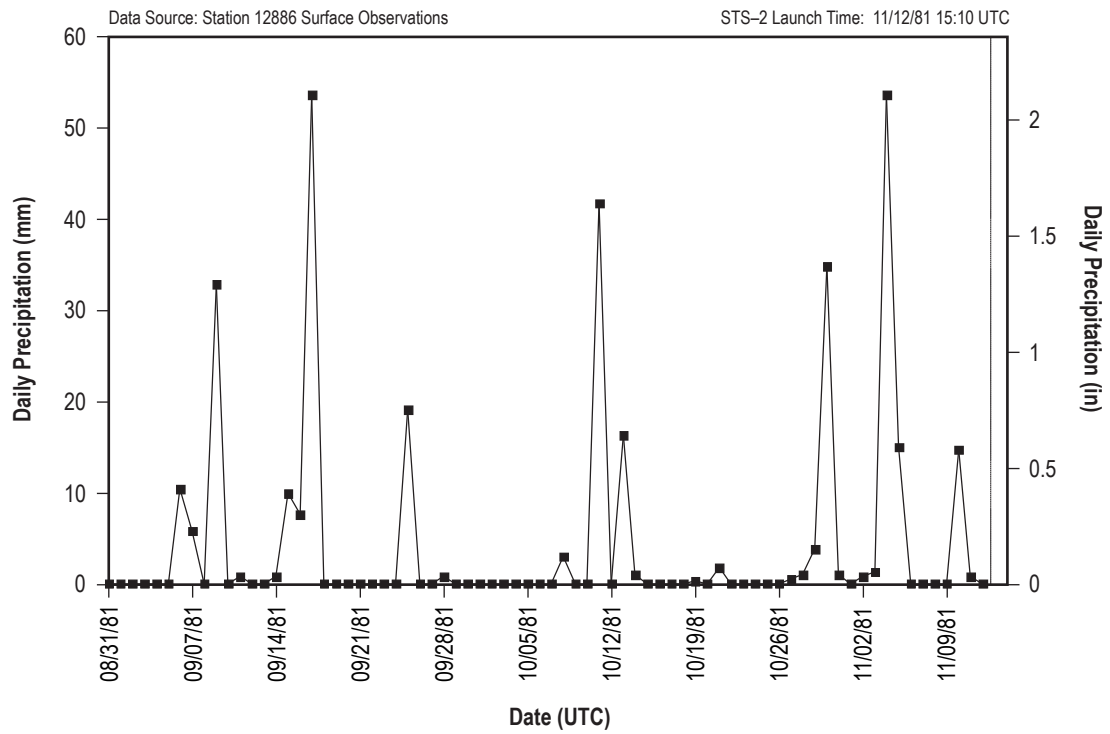


Figure 18. STS-2 daily precipitation totals.

### 5.3 STS-3

STS-3 was the third mission for *Columbia* (OV-102). It rolled out to pad 39A on February 16, 1982. STS-3 was exposed on the pad for 74 days and launched on March 22, 1982, at 16:00 UTC.

#### 5.3.1 STS-3 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-3.

#### 5.3.2 STS-3 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-3 are shown in table 9. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 9.

Table 9. STS-3 L-0 surface observations.

Temperature	24.4 °C (76 °F)
Relative humidity	71%
Sea level pressure	1,016.6 hPa (30.02 inHg)
Wind speed	2.1 m/s (4.1 kt) (10-s average)
Wind direction	50° (10-s average)
Sky condition	4/8 stratocumulus at 549 m (1,800 ft); 1/8 cirrus at 9,144 m (30,000 ft)
Visibility	16.1 km (8.7 nmi)

#### 5.3.3 STS-3 Pad Exposure Period Surface Meteorological Parameters

Figures 19–24 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-3 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 10. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 10. STS-3 pad exposure period hourly extremes.

Minimum temperature	5 °C (41 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	22%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.1 hPa (29.71 inHg)
Maximum sea level pressure	1,030.5 hPa (30.43 inHg)
Maximum wind speed and associated wind direction	13.4 m/s (26 kt) 180°
Total precipitation	75.2 mm (2.96 in)

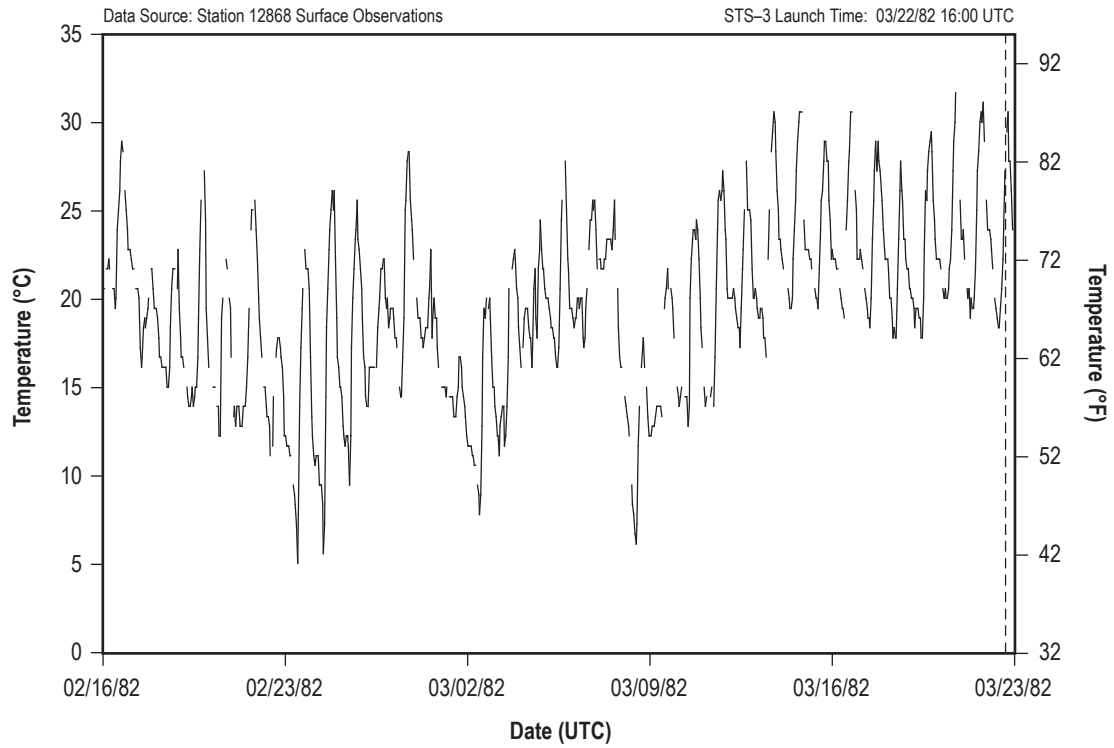


Figure 19. STS-3 hourly surface temperature.

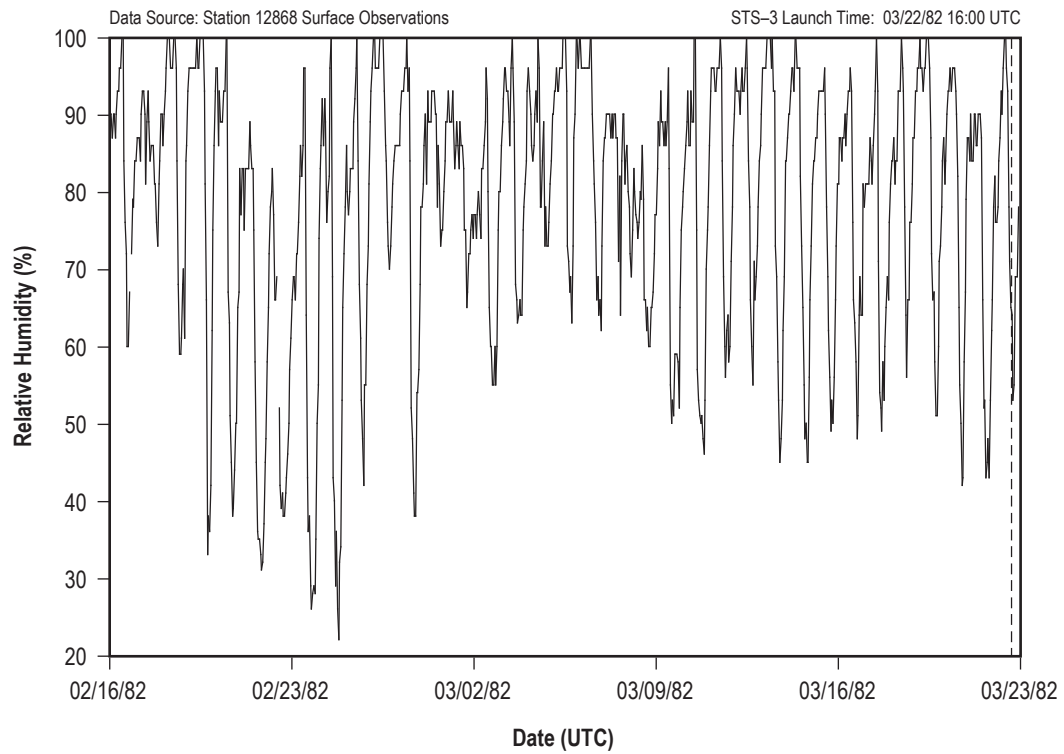


Figure 20. STS-3 hourly surface relative humidity.

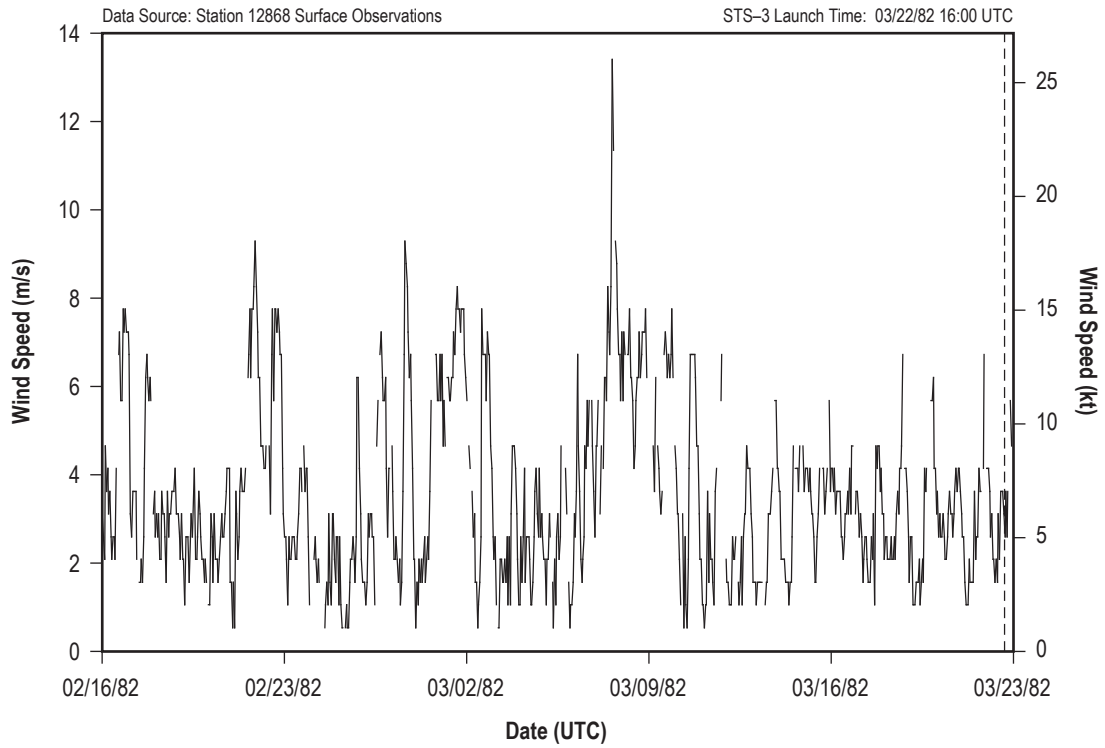


Figure 21. STS-3 hourly surface wind speed.

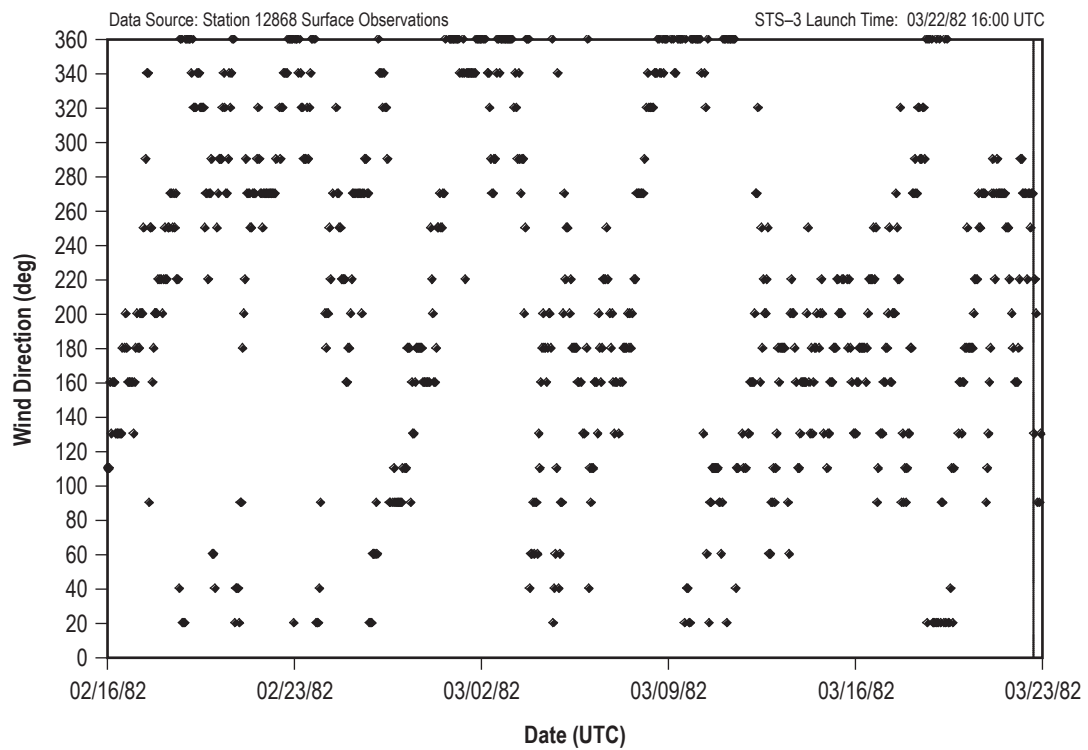


Figure 22. STS-3 hourly surface wind direction.

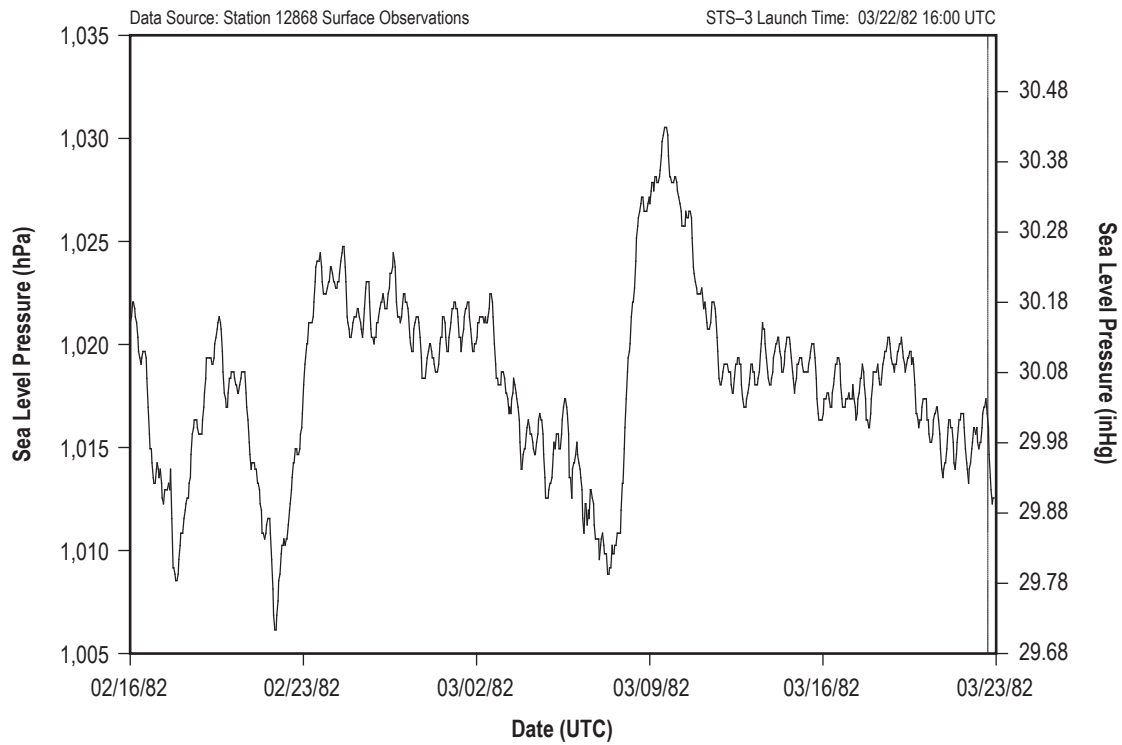


Figure 23. STS-3 hourly sea level pressure.

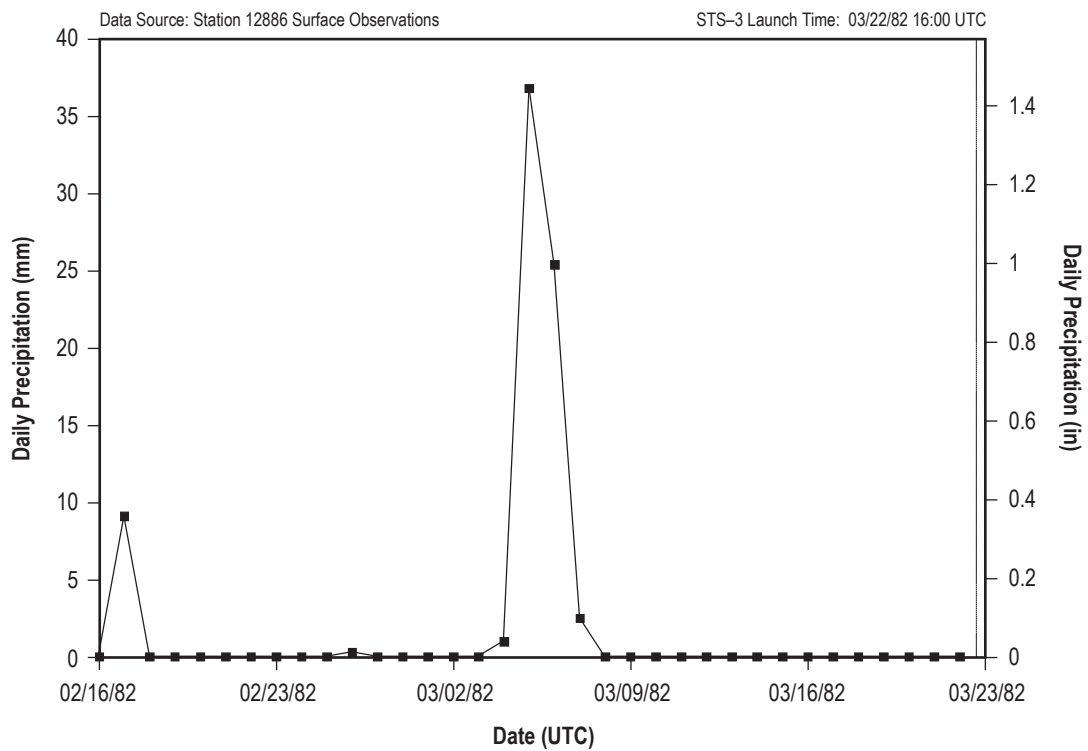


Figure 24. STS-3 daily precipitation totals.

## 5.4 STS-4

STS-4 was the fourth mission for *Columbia* (OV-102). It rolled out to pad 39A on May 26, 1982. STS-4 was exposed on the pad for 33 days and launched on June 27, 1982, at 15:00 UTC.

### 5.4.1 STS-4 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-4.

### 5.4.2 STS-4 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-4 are shown in table 11. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 11.

Table 11. STS-4 L-0 surface observations.

Temperature	29.1 °C (84.4 °F)
Relative humidity	70%
Sea level pressure	1,020.7 hPa (30.14 inHg)
Wind speed	1.8 m/s (3.4 kt) (30-s average)
Wind direction	133° (30-s average)
Sky condition	2/8 cumulus at 366 m (1,200 ft)
Visibility	16.1 km (8.7 nmi)

### 5.4.3 STS-4 Pad Exposure Period Surface Meteorological Parameters

Figures 25–30 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-4 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 12. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 12. STS-4 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	32.8 °C (91 °F)
Minimum relative humidity	45%
Maximum relative humidity	100%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,021 hPa (30.15 inHg)
Maximum wind speed and associated wind direction	14.4 m/s (28 kt) 180°
Total precipitation	203.4 mm (8.01 in)

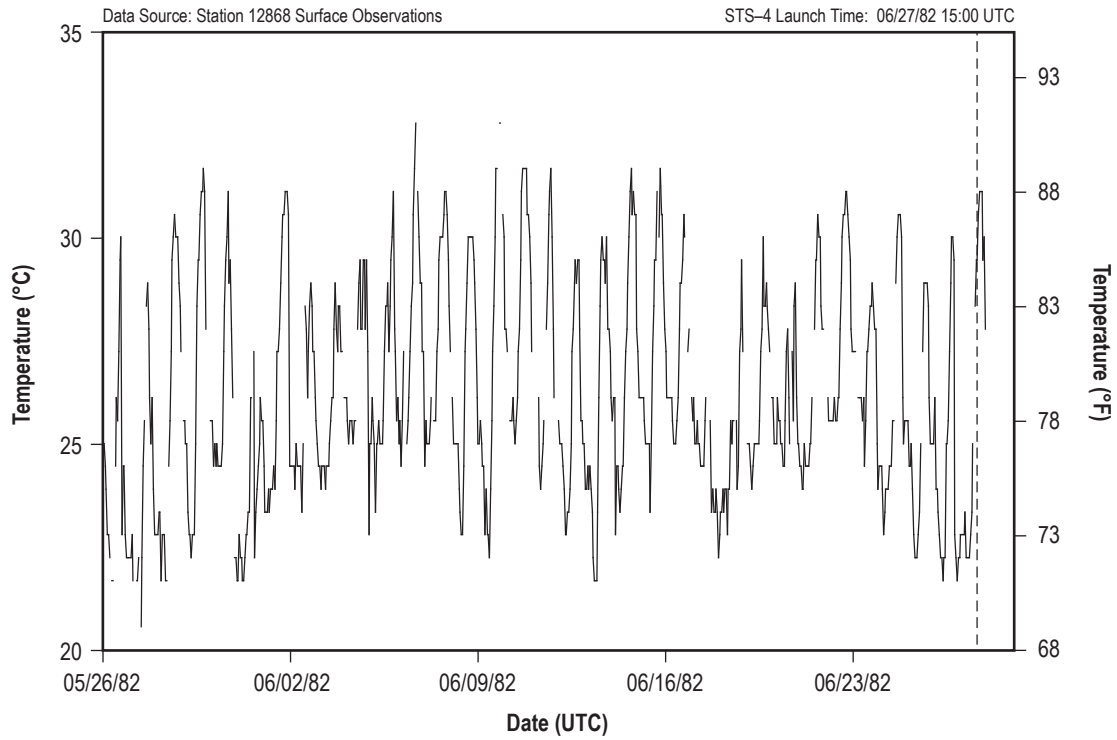


Figure 25. STS-4 hourly surface temperature.

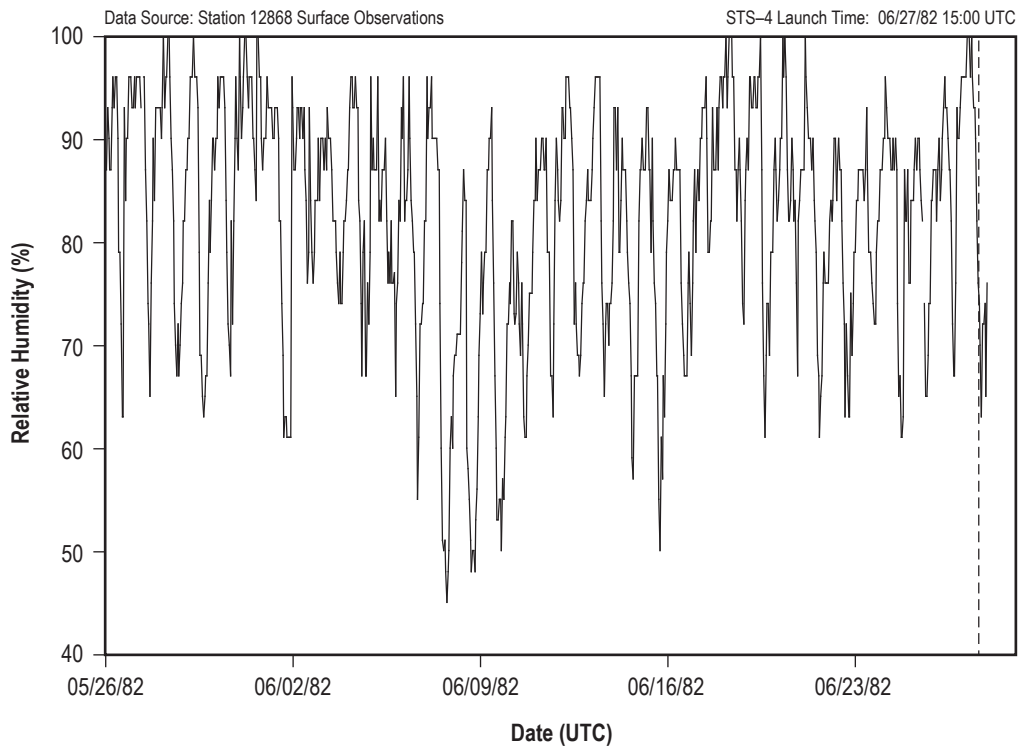


Figure 26. STS-4 hourly surface relative humidity.

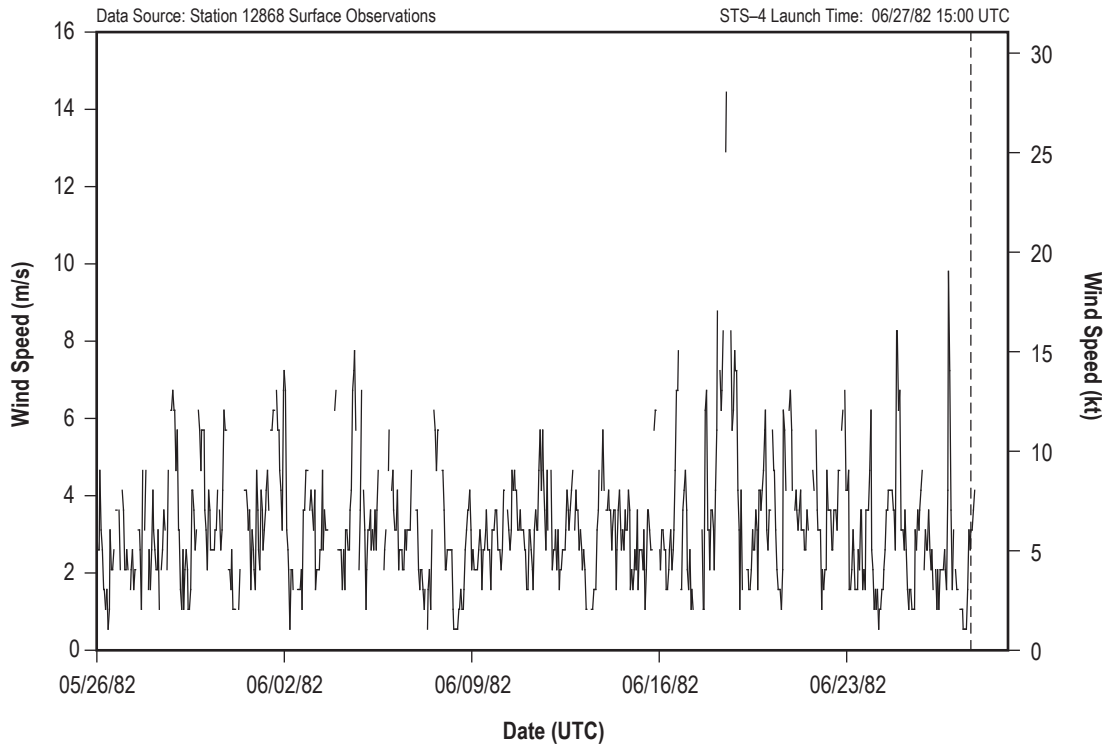


Figure 27. STS-4 hourly surface wind speed.

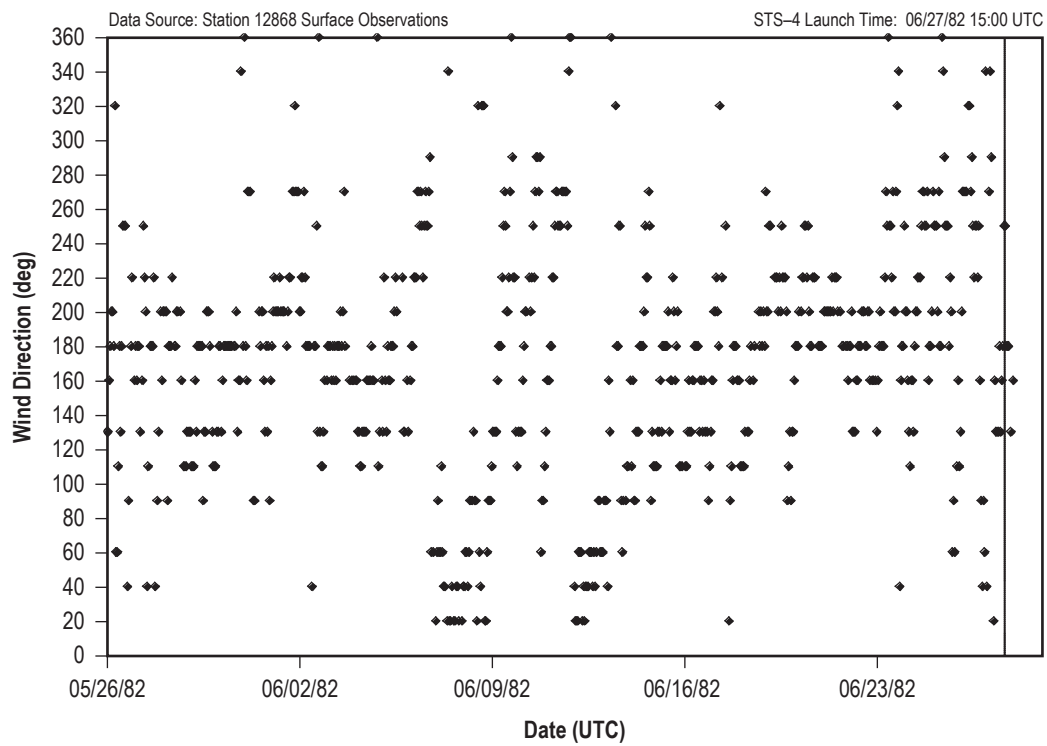


Figure 28. STS-4 hourly surface wind direction.



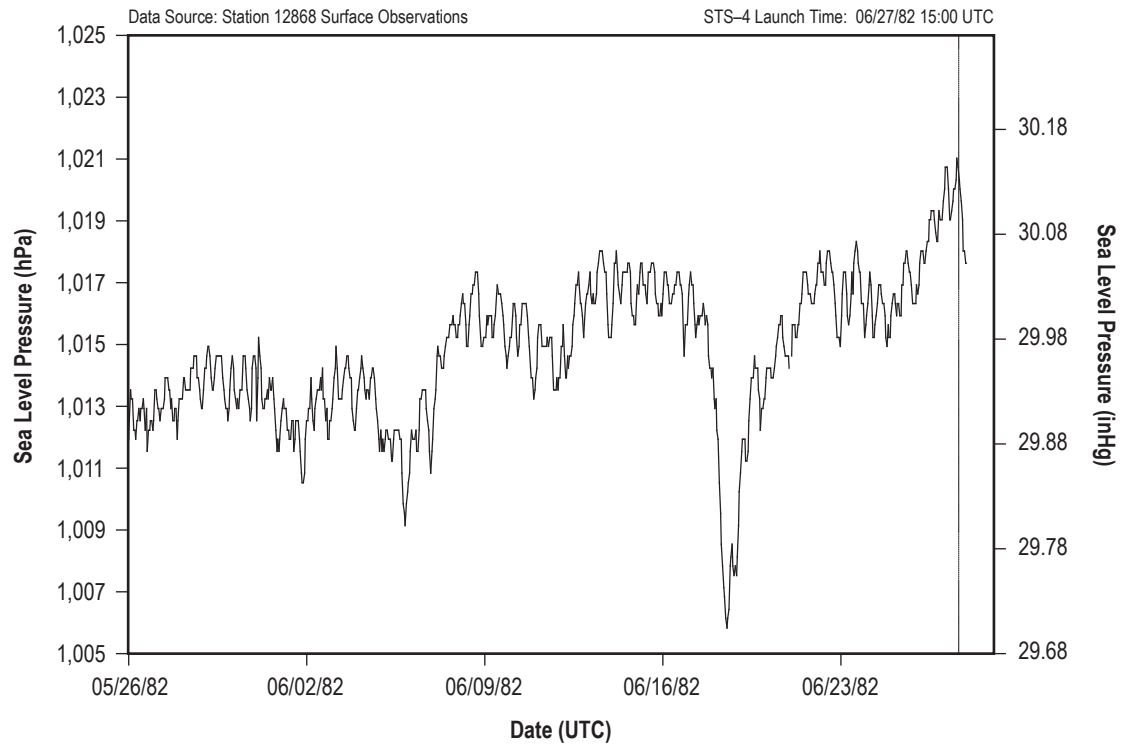


Figure 29. STS-4 hourly sea level pressure.

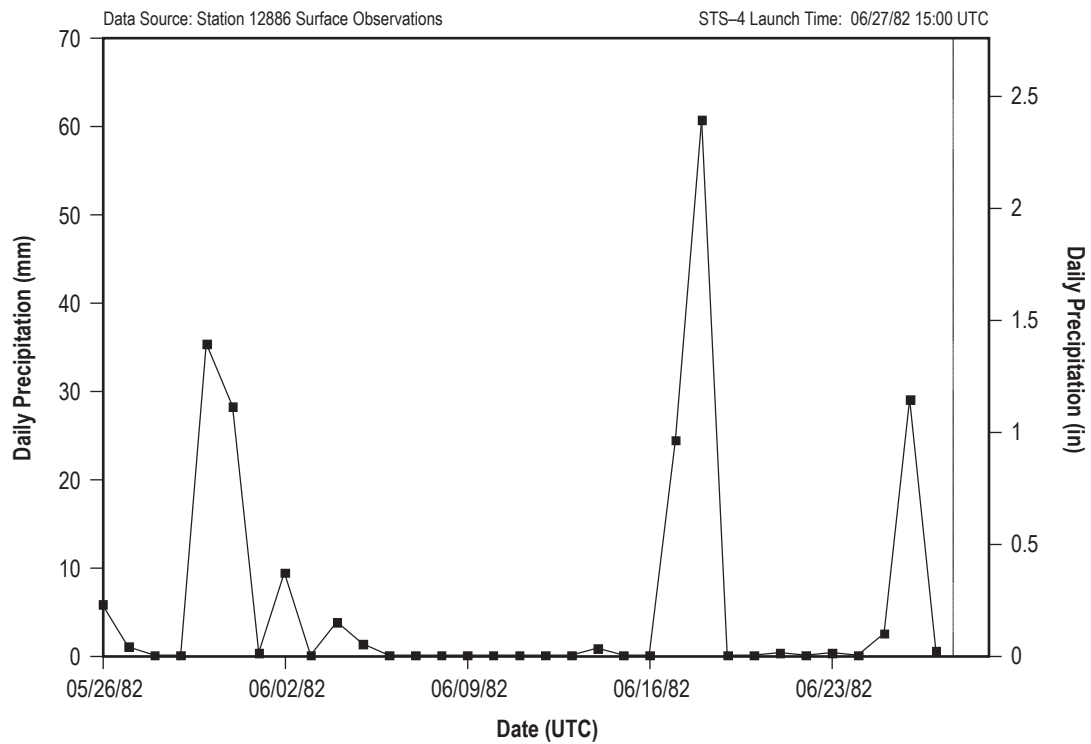


Figure 30. STS-4 daily precipitation totals.

## 5.5 STS-5

STS-5 was the fifth mission for *Columbia* (OV-102). It rolled out to pad 39A on September 21, 1982. STS-5 was exposed on the pad for 52 days and launched on November 11, 1982, at 12:19 UTC.

### 5.5.1 STS-5 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-5.

### 5.5.2 STS-5 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-5 are shown in table 13. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 13.

Table 13. STS-5 L-0 surface observations.

Temperature	22 °C (71.6 °F)
Relative humidity	59%
Sea level pressure	1,023.3 hPa (30.22 inHg)
Wind speed	6.7 m/s (13 kt) (1-min average)
Wind direction	90° (1-min average)
Sky condition	1/8 stratocumulus at 1,219 m (4,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.5.3 STS-5 Pad Exposure Period Surface Meteorological Parameters

Figures 31–36 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-5 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 14. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 14. STS-5 pad exposure period hourly extremes.

Minimum temperature	10.6 °C (51 °F)
Maximum temperature	31.1 °C (88 °F)
Minimum relative humidity	41%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,024 hPa (30.24 inHg)
Maximum wind speed and associated wind direction	9.3 m/s (18 kt) 360°
Total precipitation	102.1 mm (4.02 in)

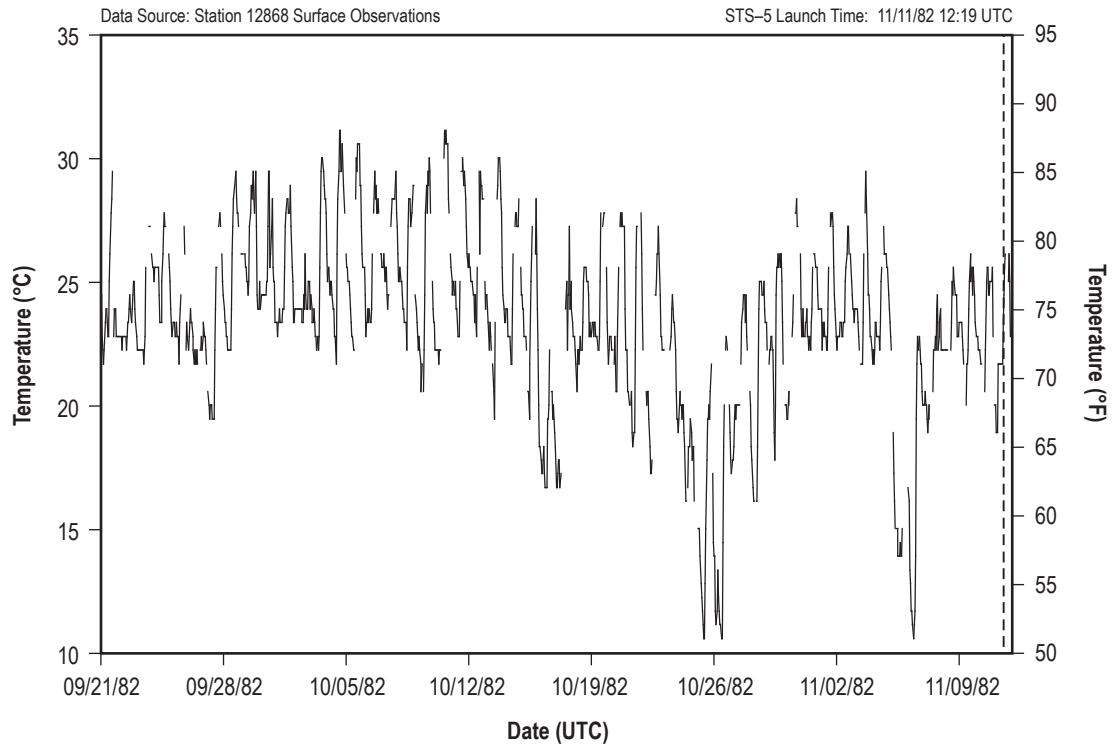


Figure 31. STS-5 hourly surface temperature.

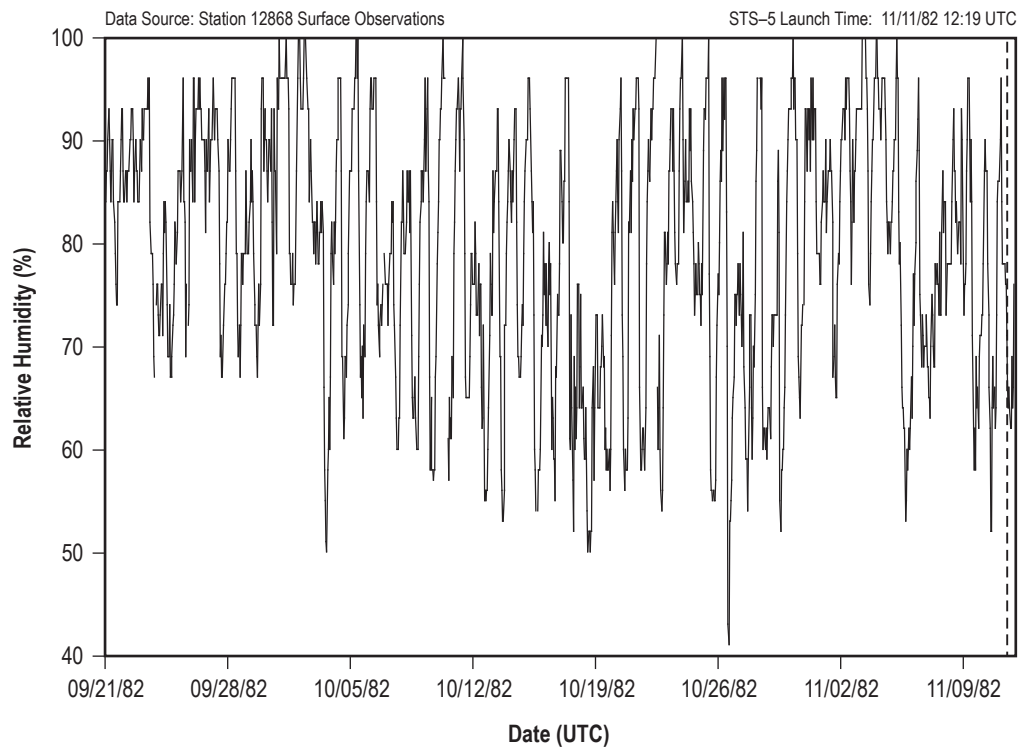


Figure 32. STS-5 hourly surface relative humidity.

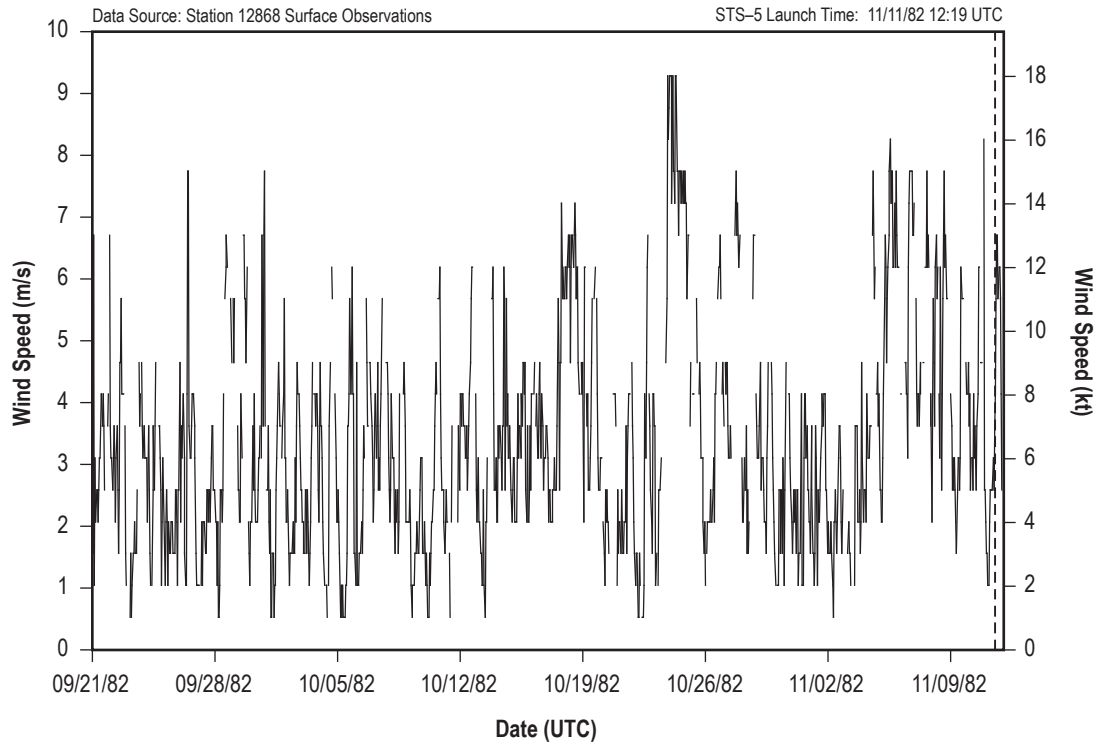


Figure 33. STS-5 hourly surface wind speed.

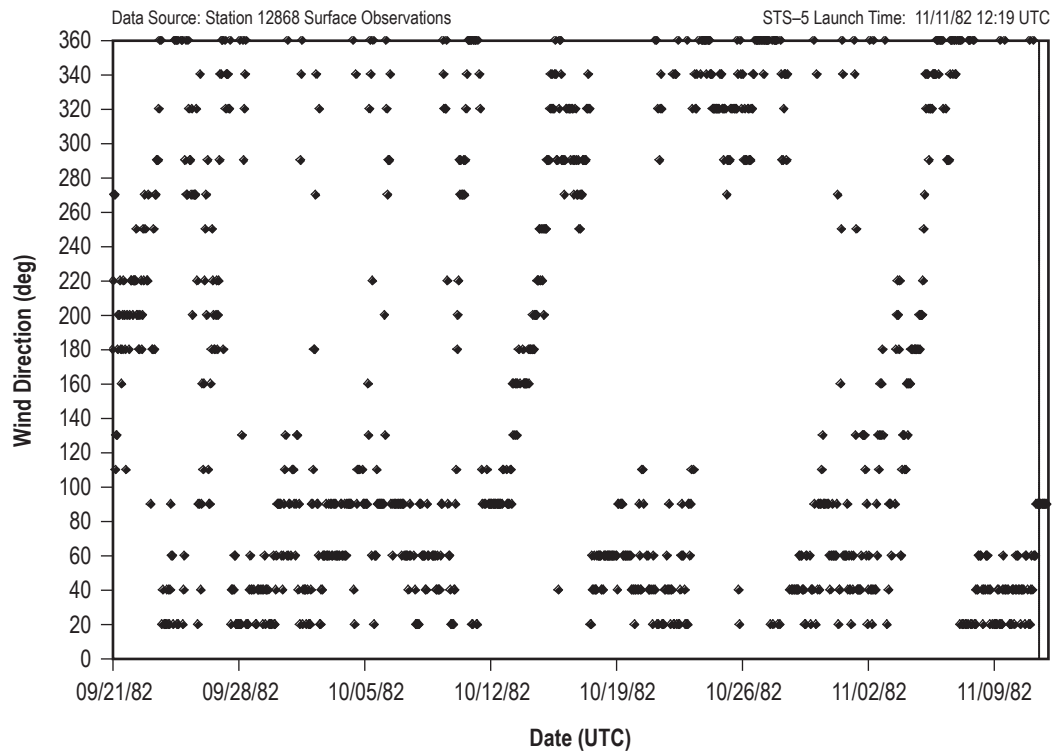


Figure 34. STS-5 hourly surface wind direction.

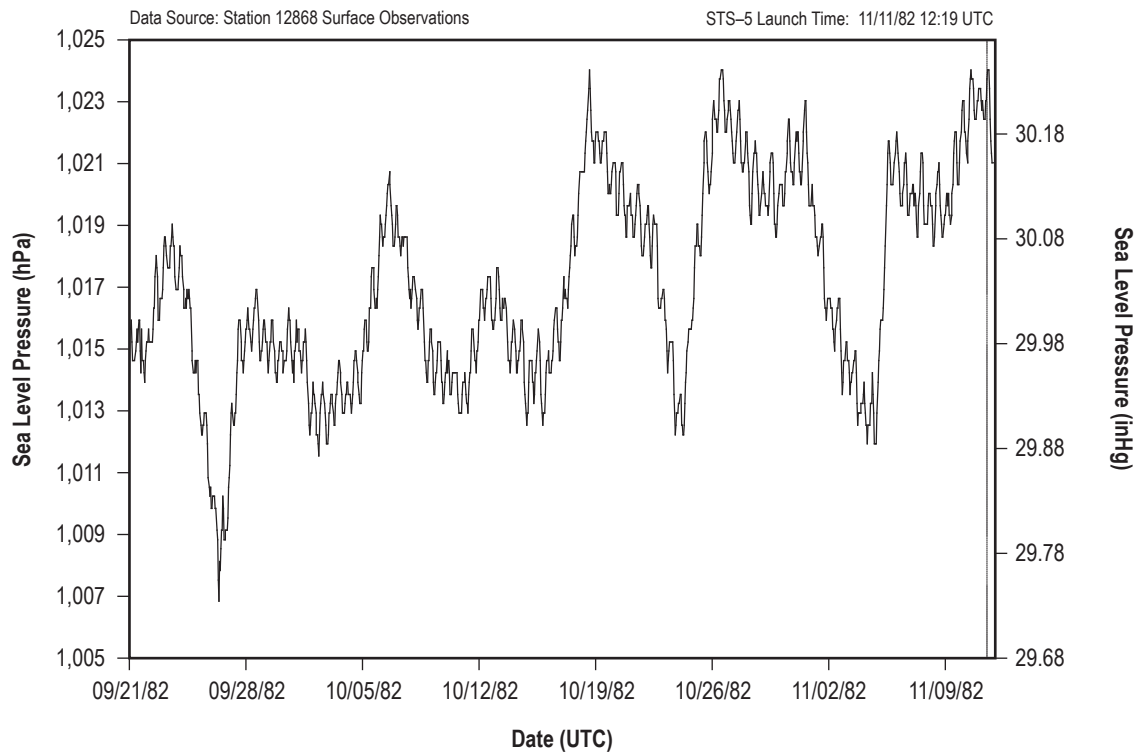


Figure 35. STS-5 hourly sea level pressure.

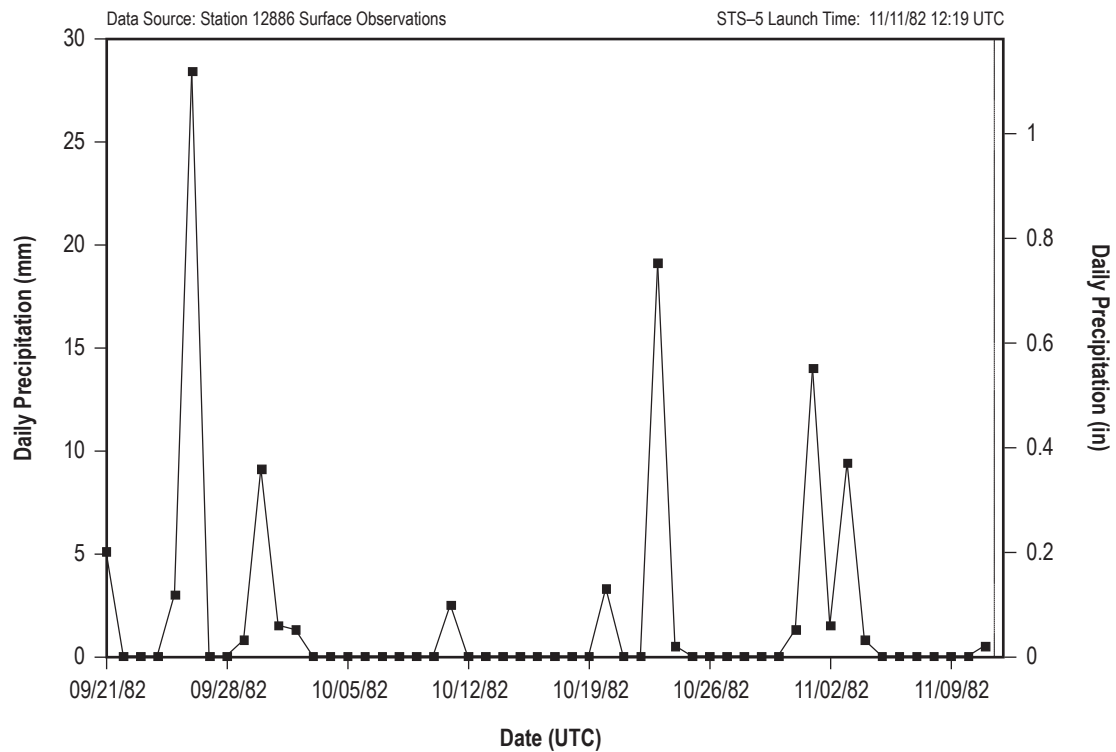


Figure 36. STS-5 daily precipitation totals.

## 5.6 STS-6

STS-6 was the first mission for *Challenger* (OV-099). It rolled out to pad 39A on November 30, 1982. STS-6 was exposed on the pad for 126 days and launched on April 4, 1983, at 18:30 UTC.

### 5.6.1 STS-6 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-6.

### 5.6.2 STS-6 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-6 are shown in table 15. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 15.

Table 15. STS-6 L-0 surface observations.

Temperature	22.8 °C (73 °F)
Relative humidity	55%
Sea level pressure	1,019 hPa (30.09 inHg)
Wind speed	3.9 m/s (7.5 kt) (1-min average)
Wind direction	63° (1-min average)
Sky condition	2/8 cumulus at 1,067 m (3,500 ft); 2/8 cirrus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.6.3 STS-6 Pad Exposure Period Surface Meteorological Parameters

Figures 37–42 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-6 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 16. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 16. STS-6 pad exposure period hourly extremes.

Minimum temperature	1.7 °C (35 °F)
Maximum temperature	28.9 °C (84 °F)
Minimum relative humidity	25%
Maximum relative humidity	100%
Minimum sea level pressure	991.4 hPa (29.28 inHg)
Maximum sea level pressure	1,027.8 hPa (30.35 inHg)
Maximum wind speed and associated wind direction	14.4 m/s (28 kt) 60°
Total precipitation	482.1 mm (18.98 in)

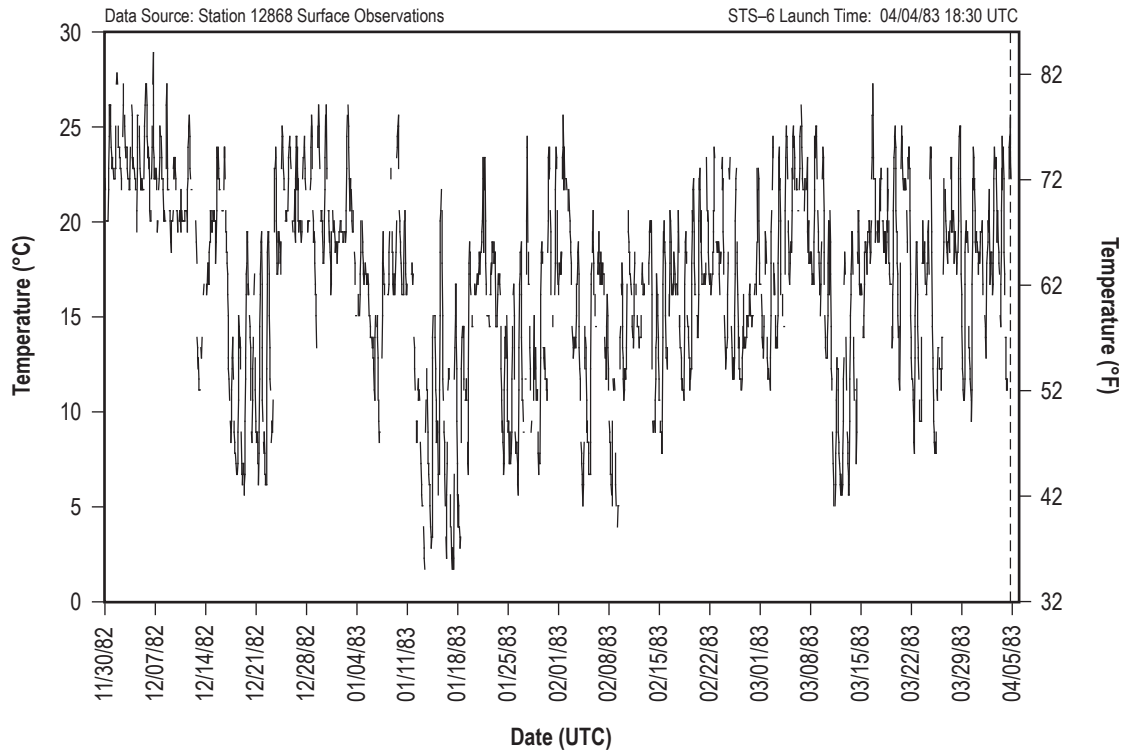


Figure 37. STS-6 hourly surface temperature.

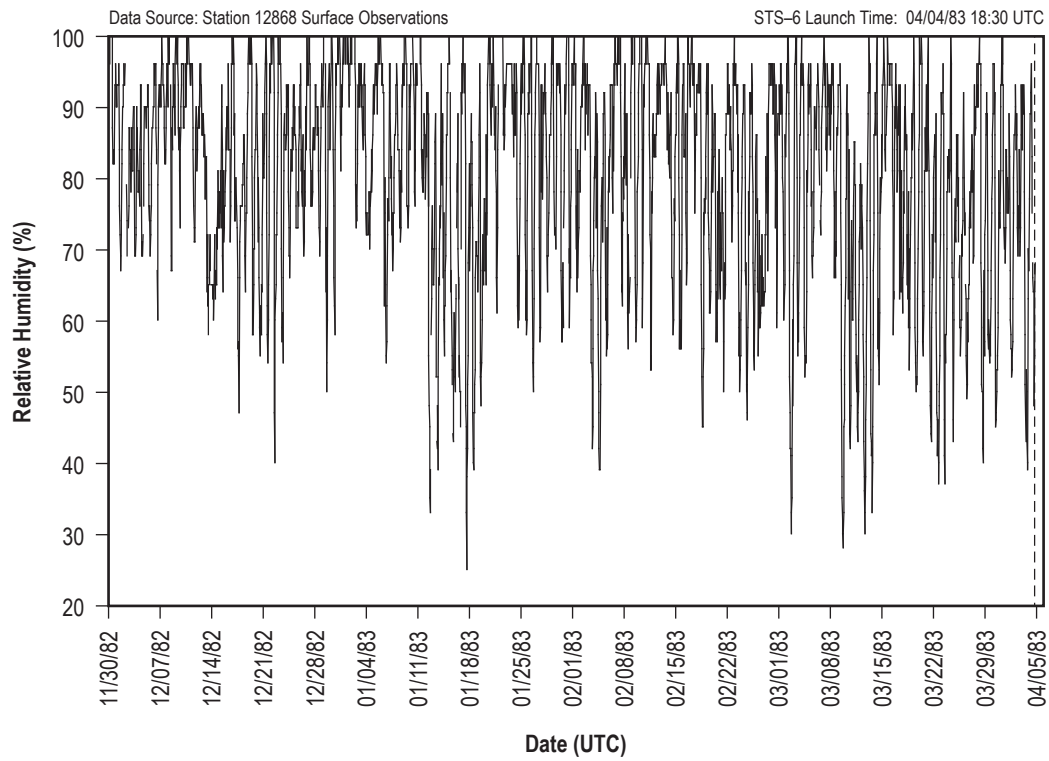


Figure 38. STS-6 hourly surface relative humidity.

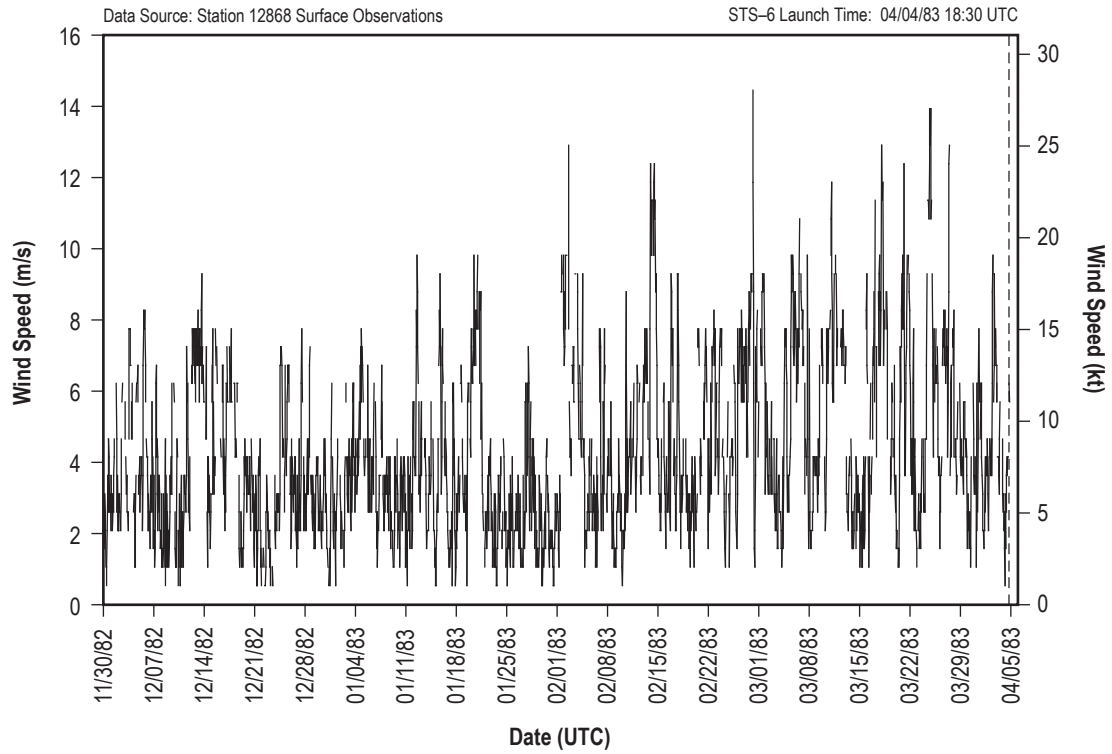


Figure 39. STS-6 hourly surface wind speed.

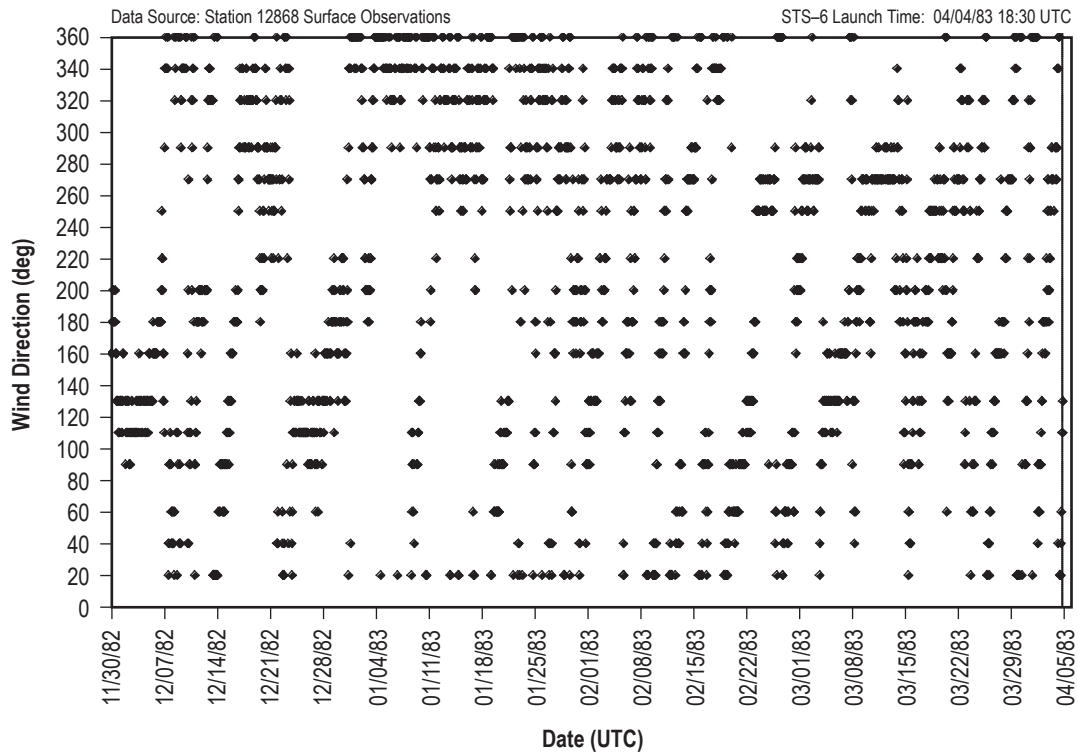


Figure 40. STS-6 hourly surface wind direction.



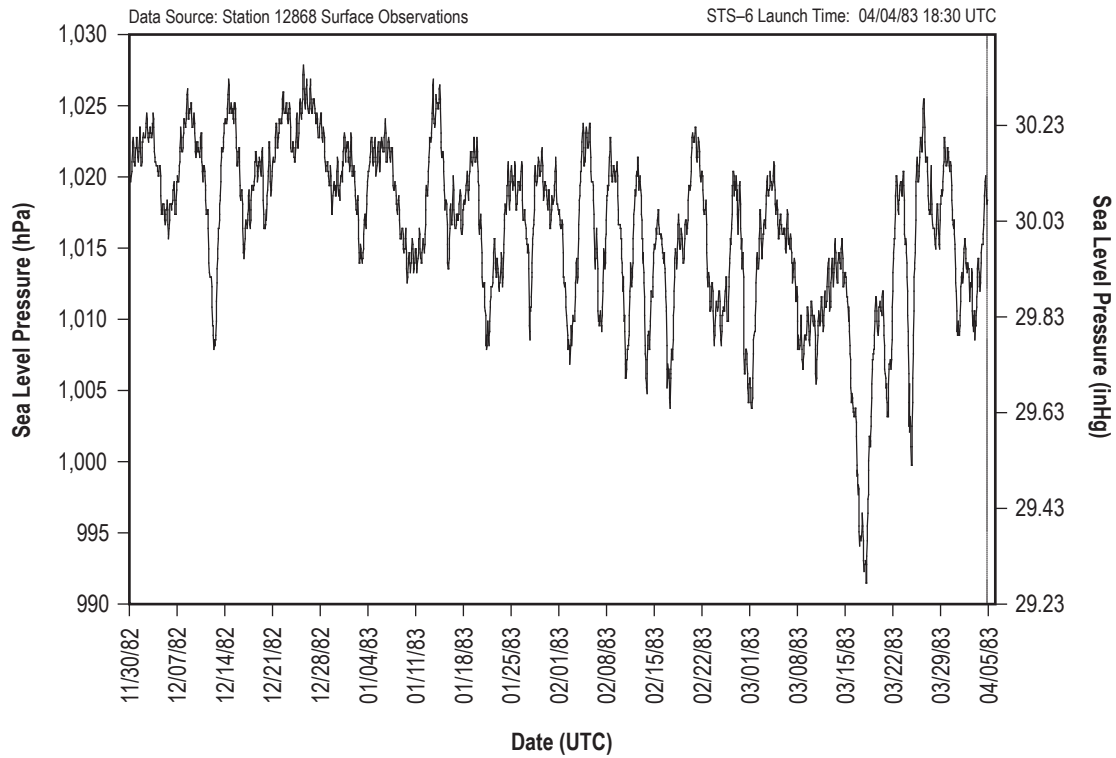


Figure 41. STS-6 hourly sea level pressure.

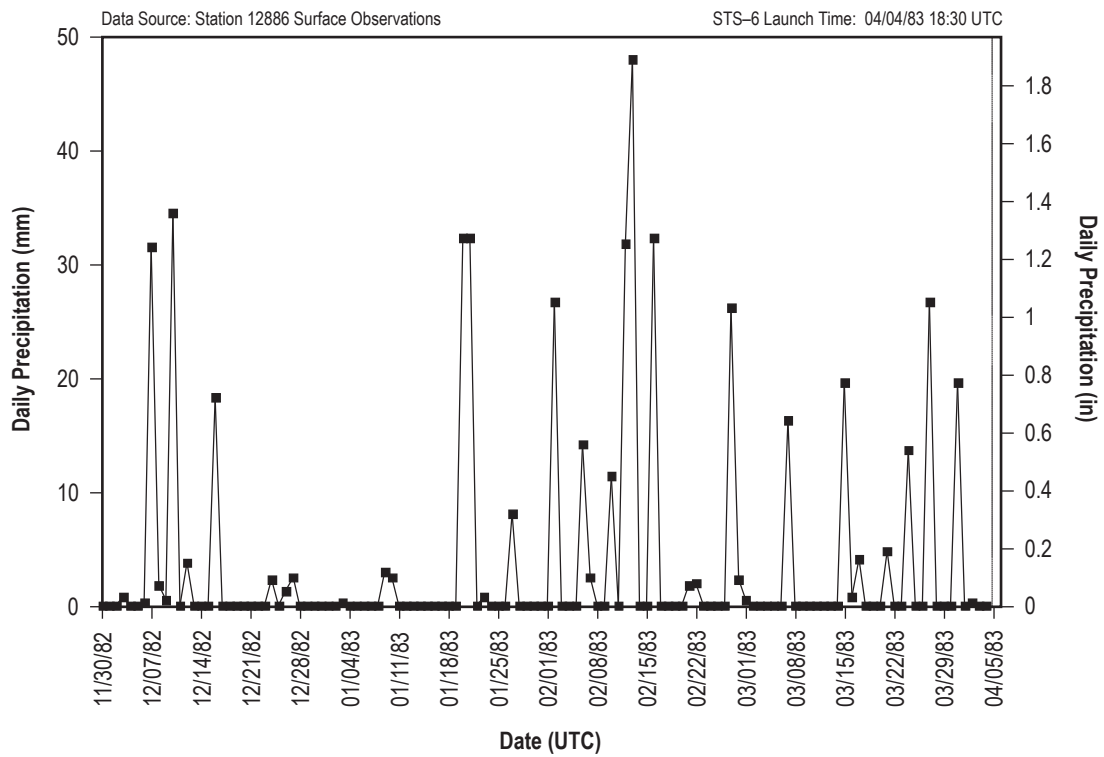


Figure 42. STS-6 daily precipitation totals.

## 5.7 STS-7

STS-7 was the second mission for *Challenger* (OV-099). It rolled out to pad 39A on May 26, 1983. STS-7 was exposed on the pad for 24 days and launched on June 18, 1983, at 11:33 UTC.

### 5.7.1 STS-7 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-7.

### 5.7.2 STS-7 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-7 are shown in table 17. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 17.

Table 17. STS-7 L-0 surface observations.

Temperature	25.1 °C (77.2 °F)
Relative humidity	80%
Sea level pressure	1,015.2 hPa (29.98 inHg)
Wind speed	1.8 m/s (3.5 kt) (10-s average)
Wind direction	10° (10-s average)
Sky condition	4/8 cumulus at 792 m (2,600 ft); 2/8 stratocumulus at 1,524 m (5,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.7.3 STS-7 Pad Exposure Period Surface Meteorological Parameters

Figures 43–48 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-7 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 18. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 18. STS-7 pad exposure period hourly extremes.

Minimum temperature	17.2 °C (63 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	26%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.1 hPa (29.71 inHg)
Maximum sea level pressure	1,018.3 hPa (30.07 inHg)
Maximum wind speed and associated wind direction	11.3 m/s (22 kt) 250°
Total precipitation	177 mm (6.97 in)

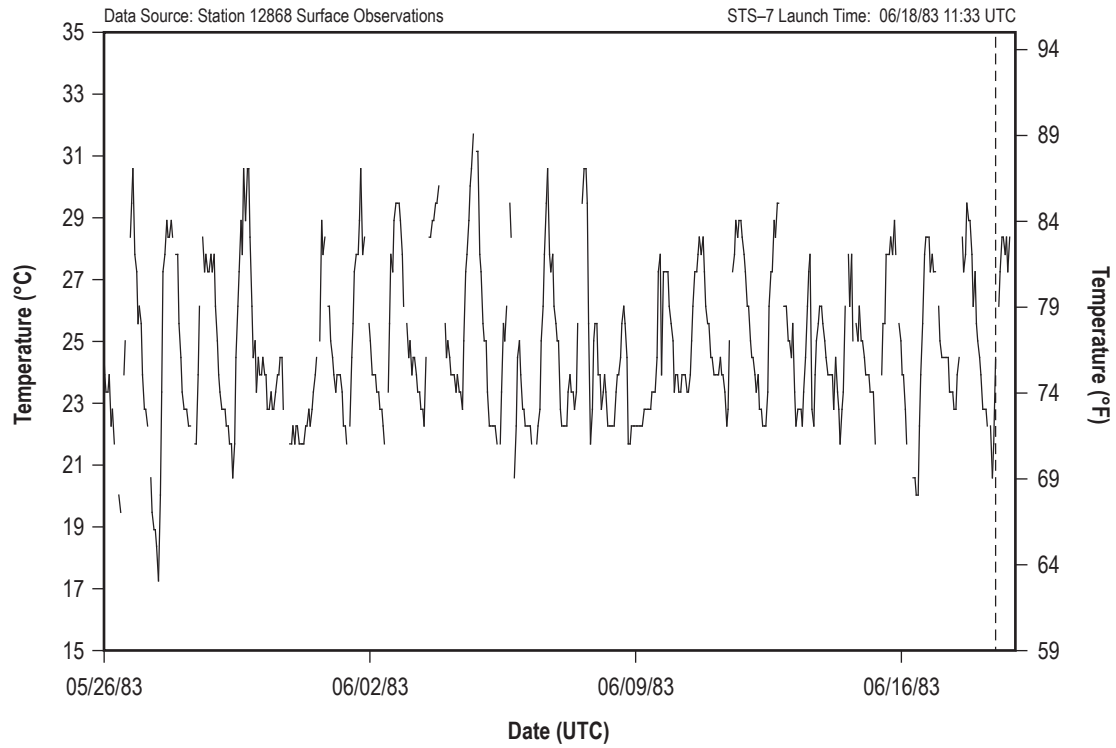


Figure 43. STS-7 hourly surface temperature.

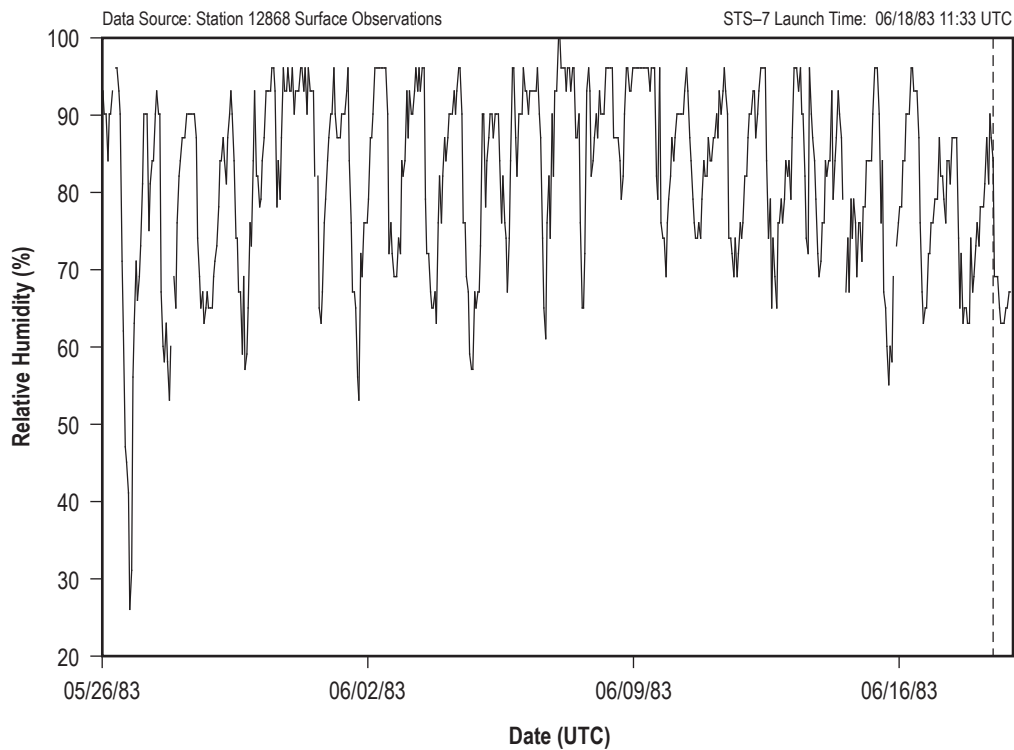


Figure 44. STS-7 hourly surface relative humidity.

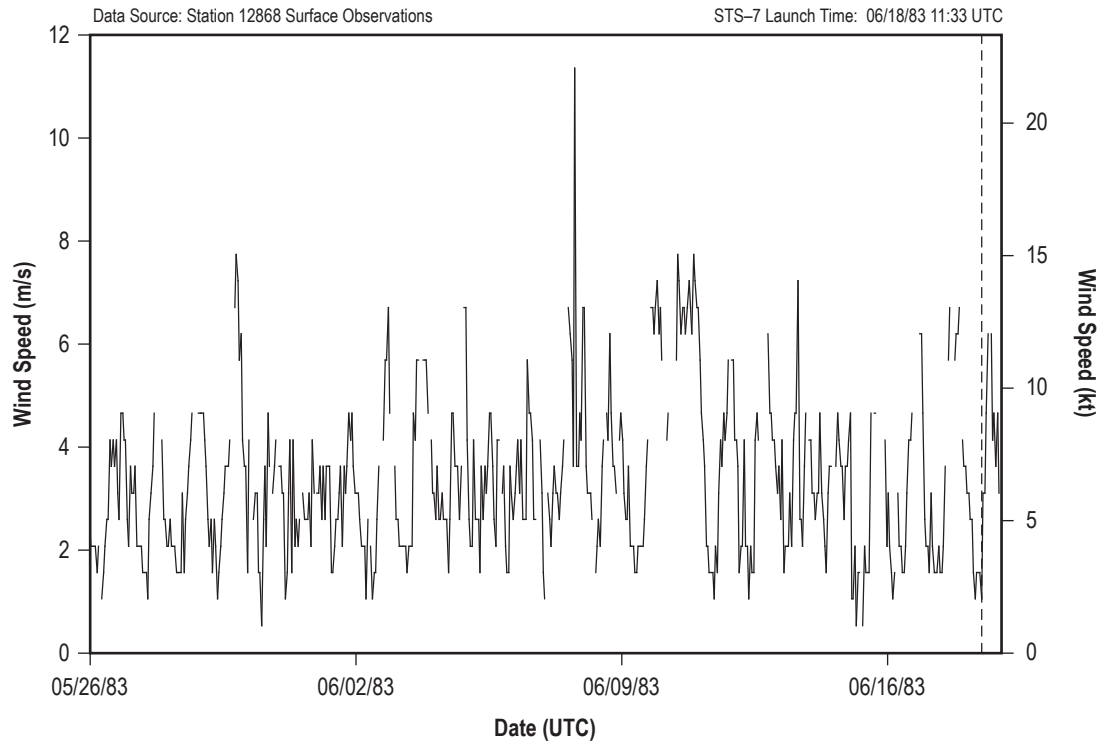


Figure 45. STS-7 hourly surface wind speed.

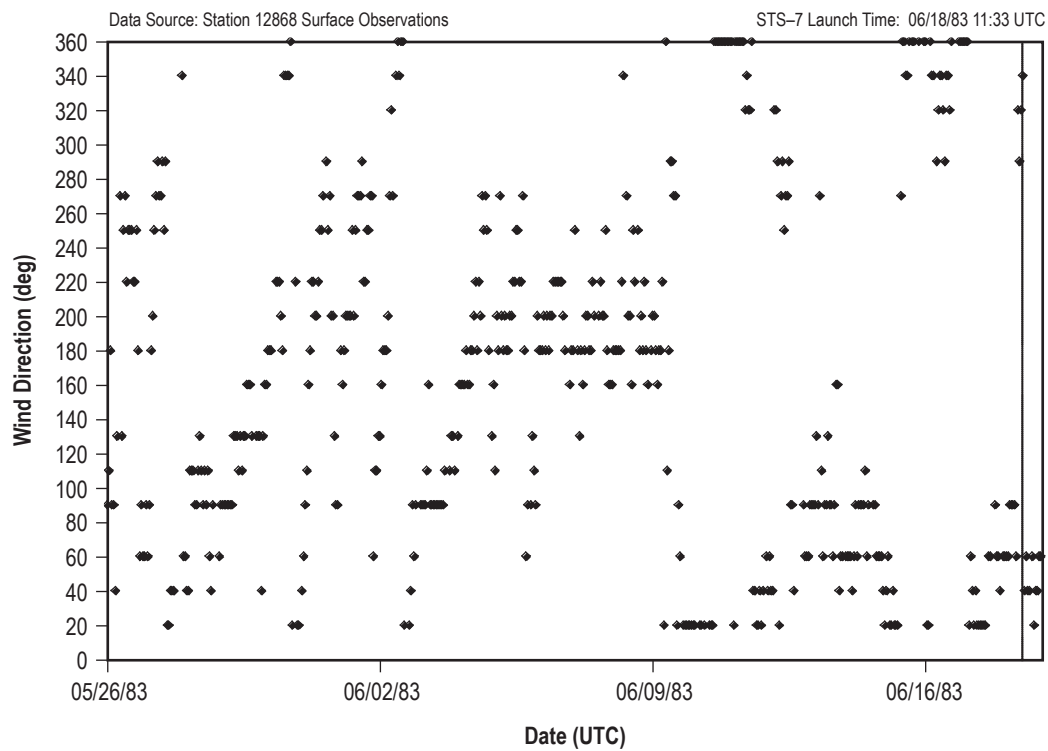


Figure 46. STS-7 hourly surface wind direction.

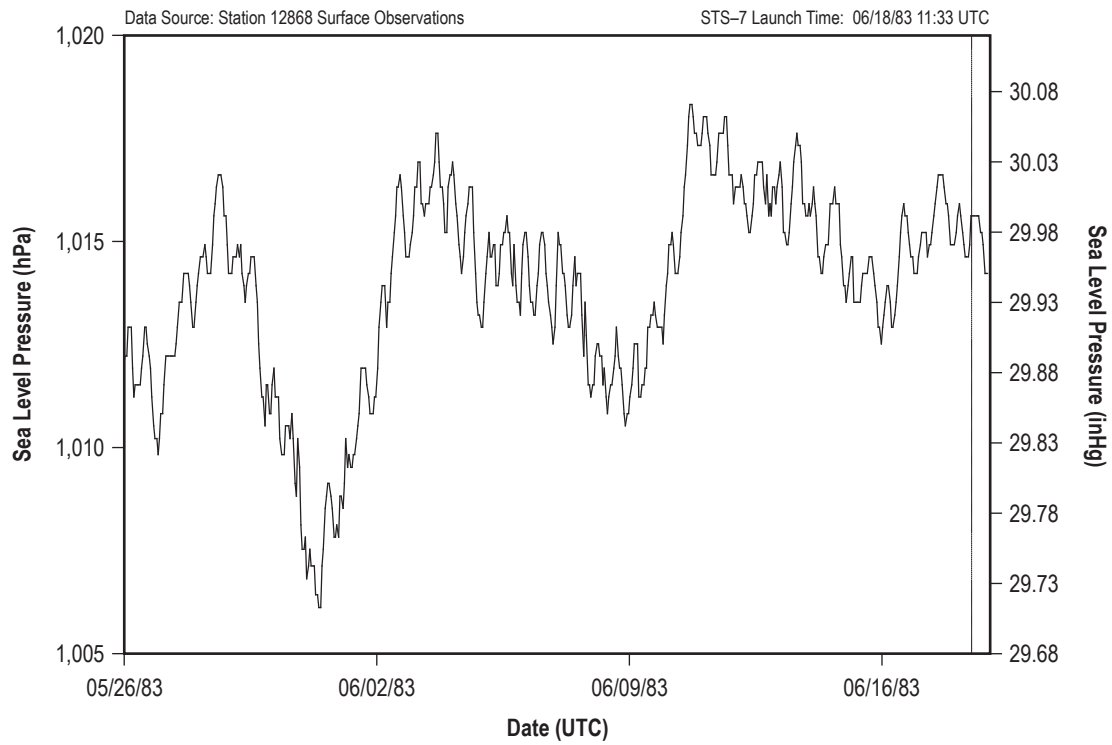


Figure 47. STS-7 hourly sea level pressure.

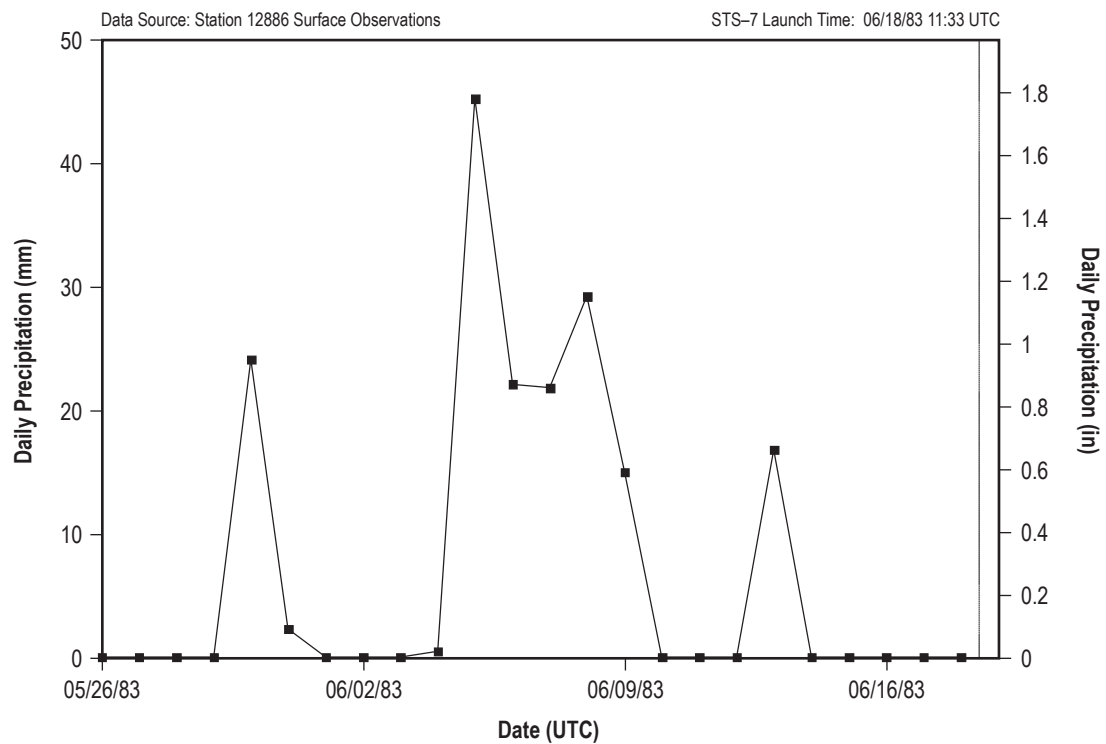


Figure 48. STS-7 daily precipitation totals.

## 5.8 STS-8

STS-8 was the third mission for *Challenger* (OV-099). It rolled out to pad 39A on August 2, 1983. STS-8 was exposed on the pad for 29 days and launched on August 30, 1983, at 06:32 UTC.

### 5.8.1 STS-8 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-8.

### 5.8.2 STS-8 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-8 are shown in table 19. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Temperature, relative humidity, pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 19.

Table 19. STS-8 L-0 surface observations.

Temperature	23.9 °C (75 °F)
Relative humidity	97%
Sea level pressure	1,011.9 hPa (29.88 inHg)
Wind speed	2.7 m/s (5.2 kt) (1-min average)
Wind direction	269° (1-min average)
Sky condition	4/8 cumulus at 914 m (3,000 ft); 7/8 altocumulus at 4,877 m (16,000 ft); 3/8 cirrus at 7,010 m (23,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.8.3 STS-8 Pad Exposure Period Surface Meteorological Parameters

Figures 49–54 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-8 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 20. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 20. STS-8 pad exposure period hourly extremes.

Minimum temperature	21.7 °C (71 °F)
Maximum temperature	35.6 °C (96 °F)
Minimum relative humidity	52%
Maximum relative humidity	100%
Minimum sea level pressure	1,010.8 hPa (29.85 inHg)
Maximum sea level pressure	1,022.4 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	8.2 m/s (16 kt) 320°
Total precipitation	123.2 mm (4.85 in)

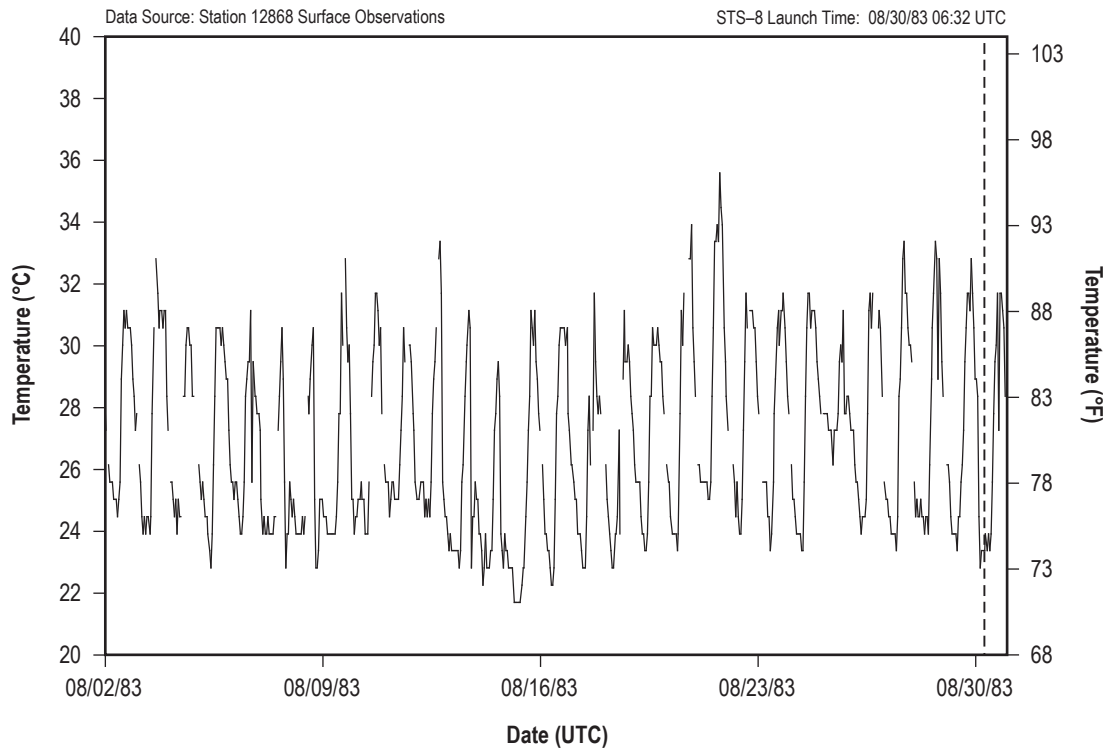


Figure 49. STS-8 hourly surface temperature.

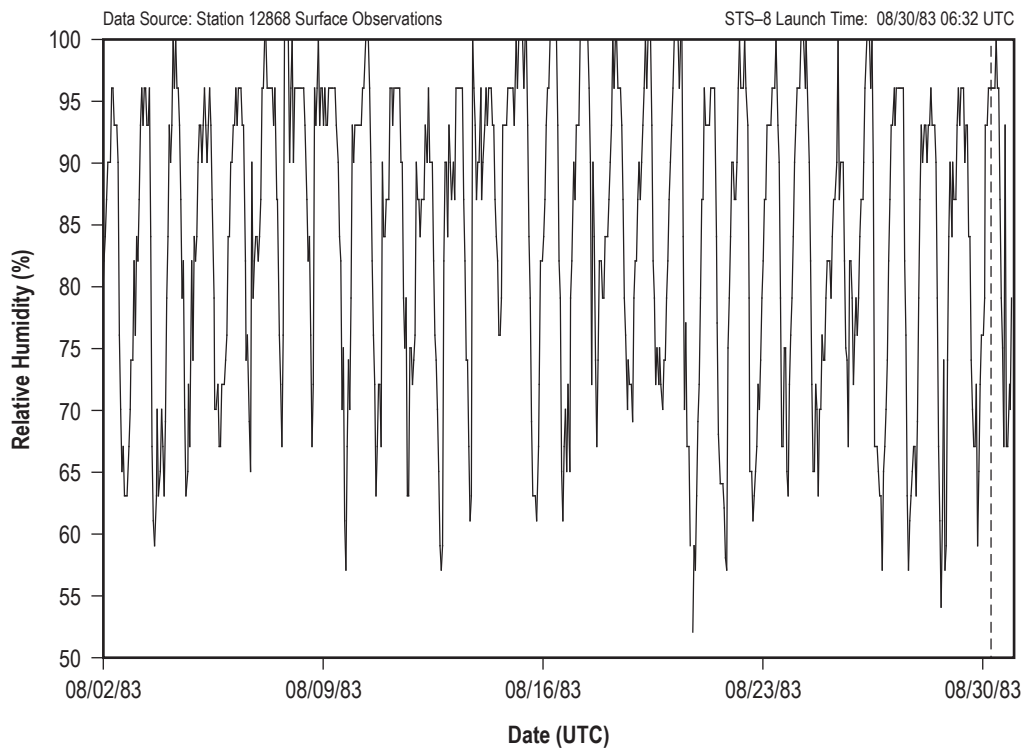


Figure 50. STS-8 hourly surface relative humidity.

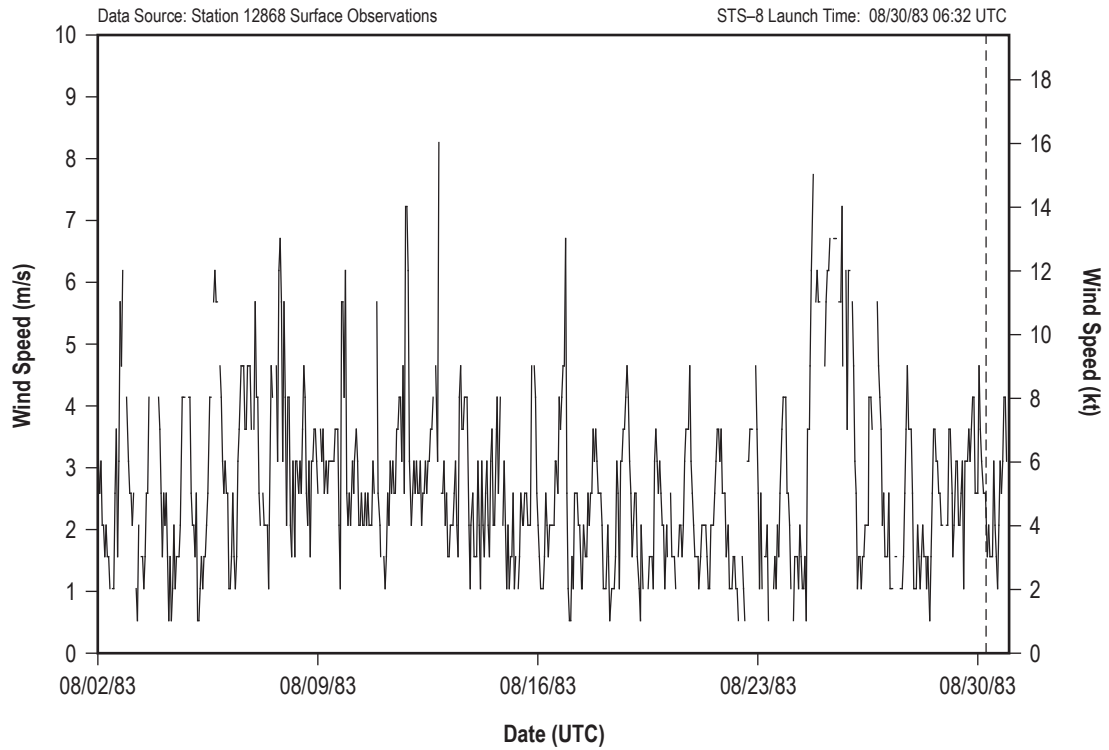


Figure 51. STS-8 hourly surface wind speed.

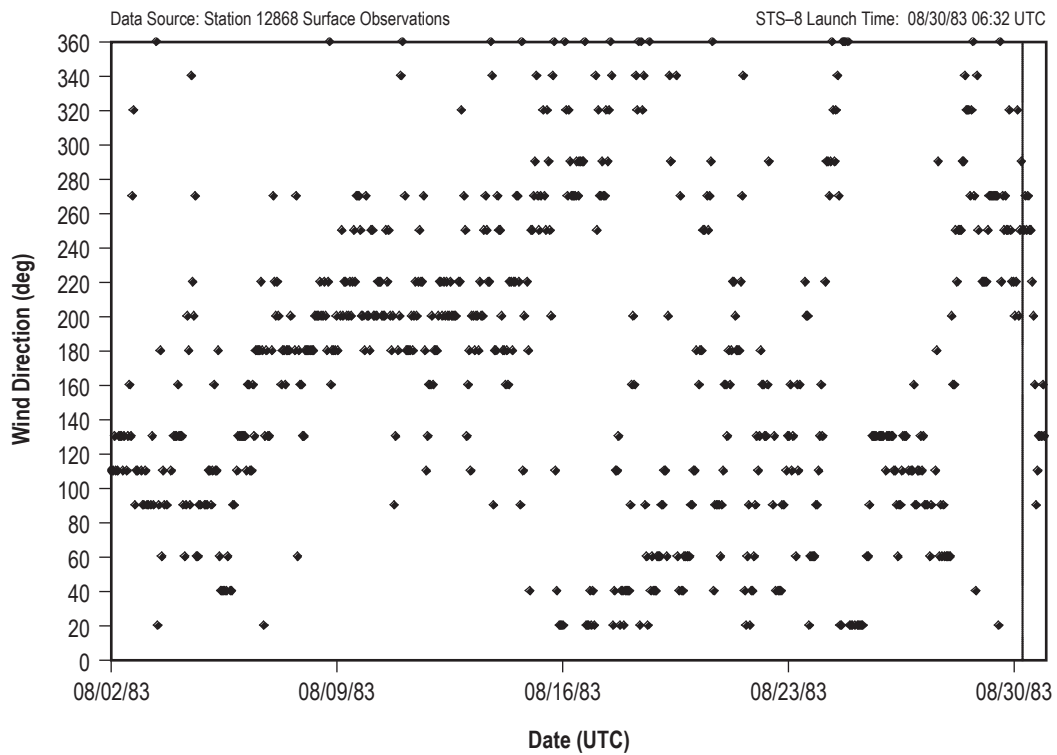


Figure 52. STS-8 hourly surface wind direction.



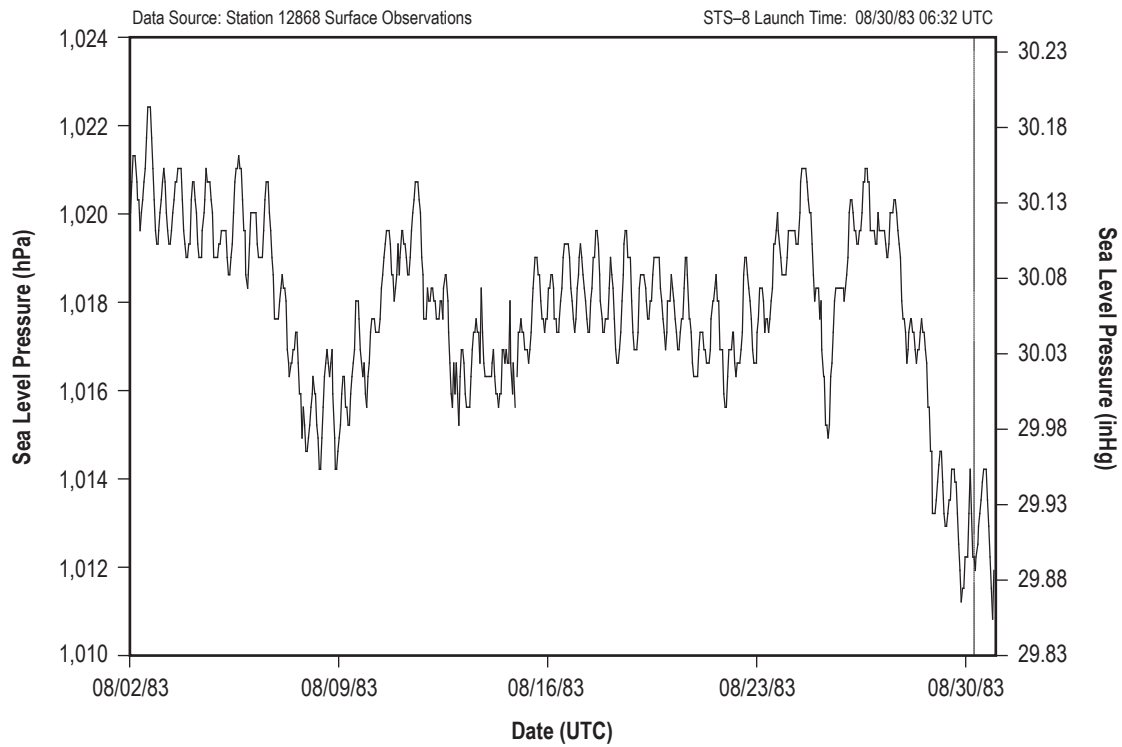


Figure 53. STS-8 hourly sea level pressure.

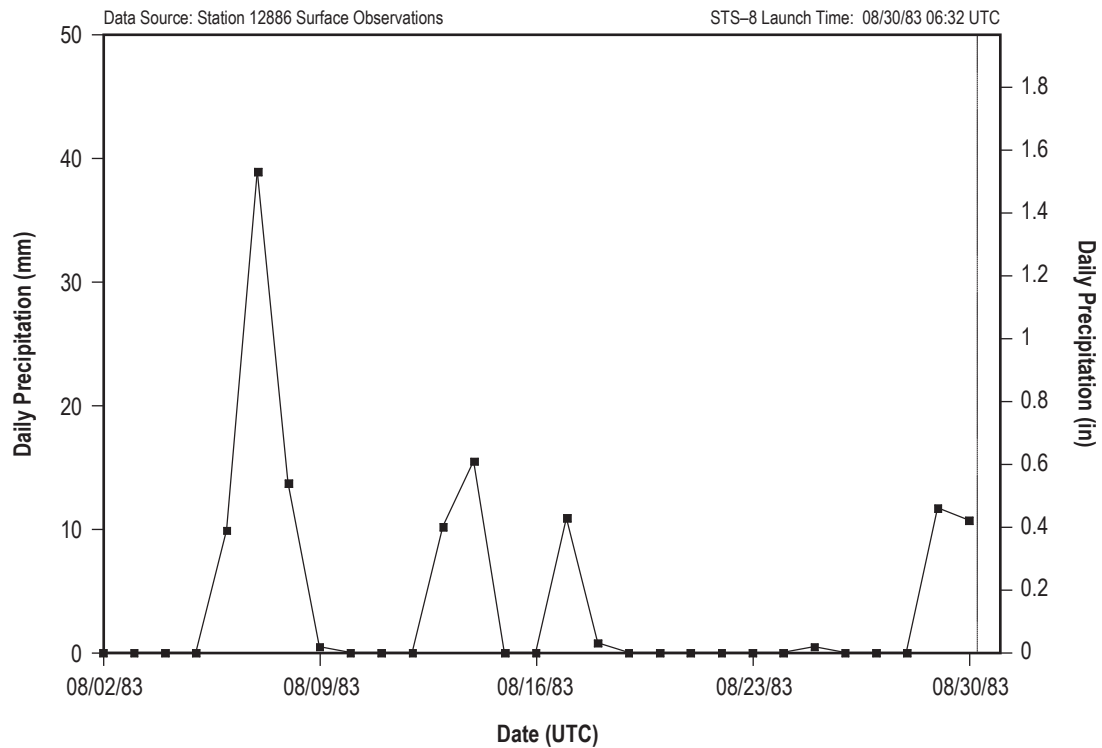


Figure 54. STS-8 daily precipitation totals.

## 5.9 STS-9

STS-9 was the sixth mission for *Columbia* (OV-102). It rolled out to pad 39A for the first time on September 28, 1983. It was rolled back from the pad on October 19, 1983. STS-9 rolled out to pad 39A for the second time on November 8, 1983. STS-9 was exposed on the pad for a total of 43 days (22 days after the first rollout and 21 days after the second rollout) and launched on November 28, 1983, at 16:00 UTC.

### 5.9.1 STS-9 Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for STS-9.

### 5.9.2 STS-9 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-9 are shown in table 21. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 21.

Table 21. STS-9 L-0 surface observations.

Temperature	24.4 °C (76 °F)
Relative humidity	83%
Sea level pressure	1,015.9 hPa (30 inHg)
Wind speed	5.8 m/s (11.3 kt) (1-min average)
Wind direction	183° (1-min average)
Sky condition	1/8 stratocumulus at 762 m (2,500 ft); 3/8 stratocumulus at 1,676 m (5,500 ft); 8/8 cirrostratus at 6,401 m (21,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.9.3 STS-9 Pad Exposure Period Surface Meteorological Parameters

Figures 55–60 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-9 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 22. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 22. STS-9 pad exposure period hourly extremes.

Minimum temperature	21.7 °C (41 °F)
Maximum temperature	35.6 °C (92 °F)
Minimum relative humidity	34%
Maximum relative humidity	100%
Minimum sea level pressure	1,008.8 hPa (29.85 inHg)
Maximum sea level pressure	1,024 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	8.2 m/s (15 kt) 290°
Total precipitation	136.4 mm (5.37 in)

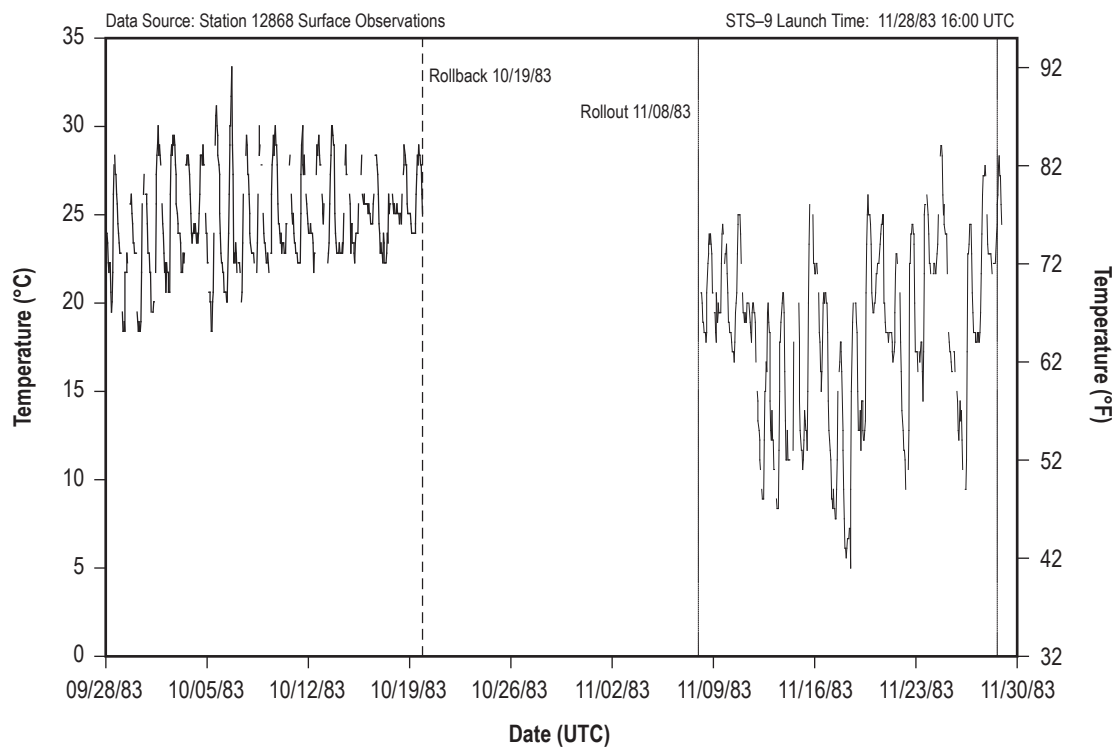


Figure 55. STS-9 hourly surface temperature.

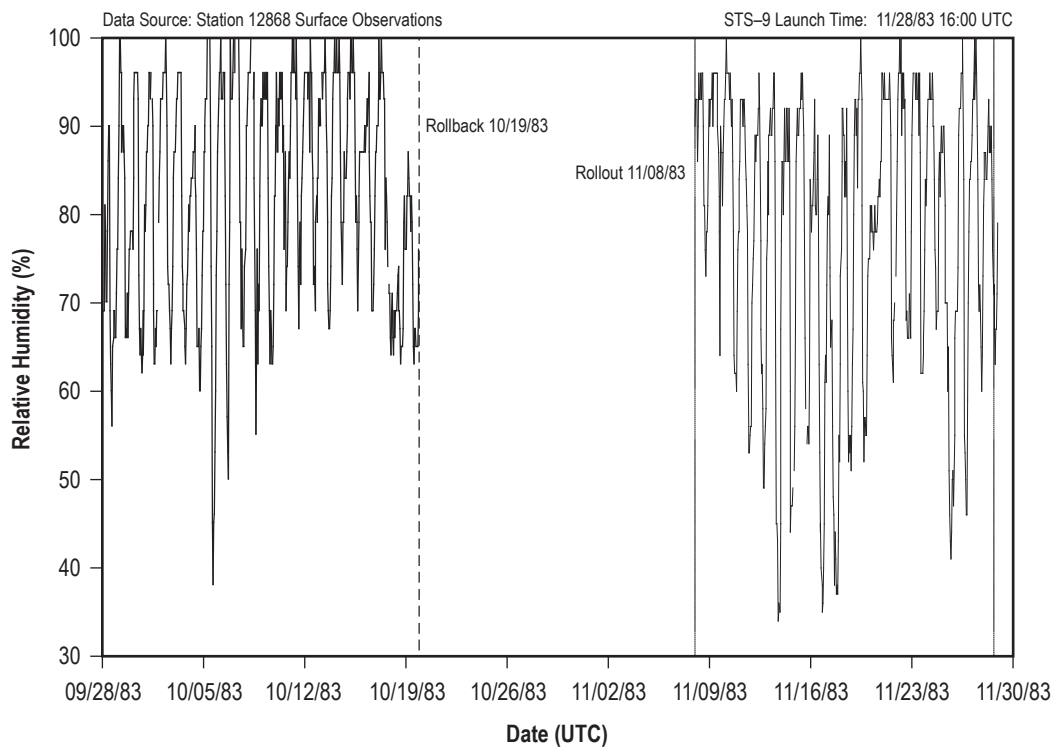


Figure 56. STS-9 hourly surface relative humidity.

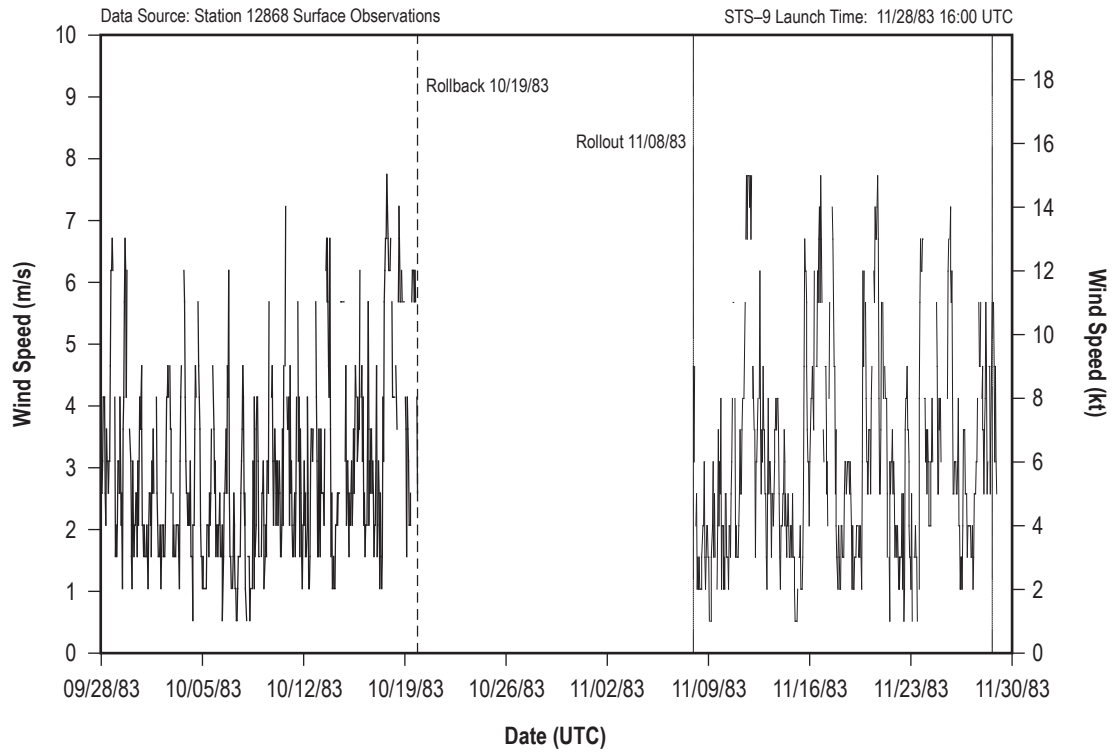


Figure 57. STS-9 hourly surface wind speed.

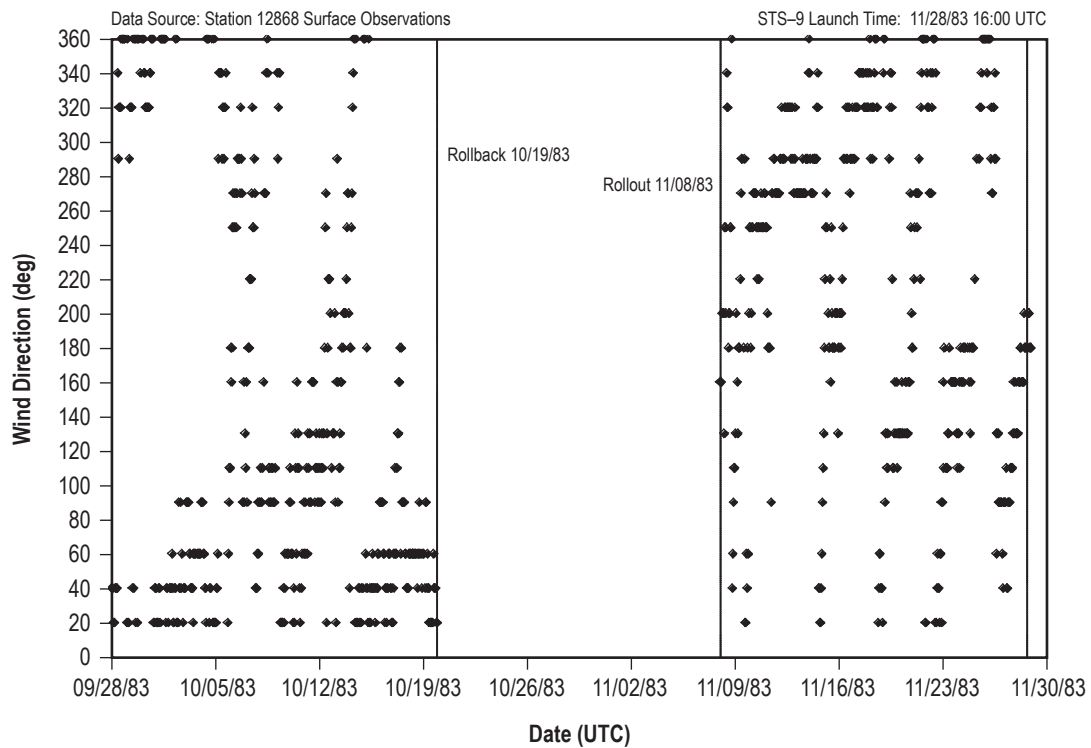


Figure 58. STS-9 hourly surface wind direction.

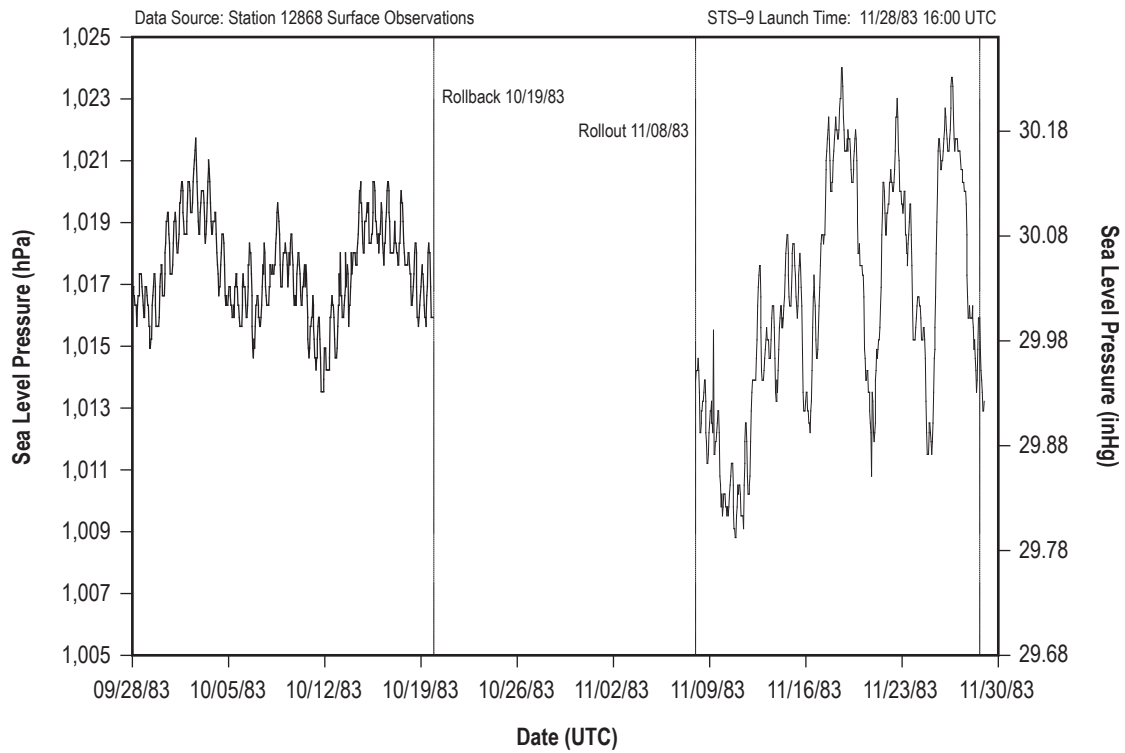


Figure 59. STS-9 hourly sea level pressure.

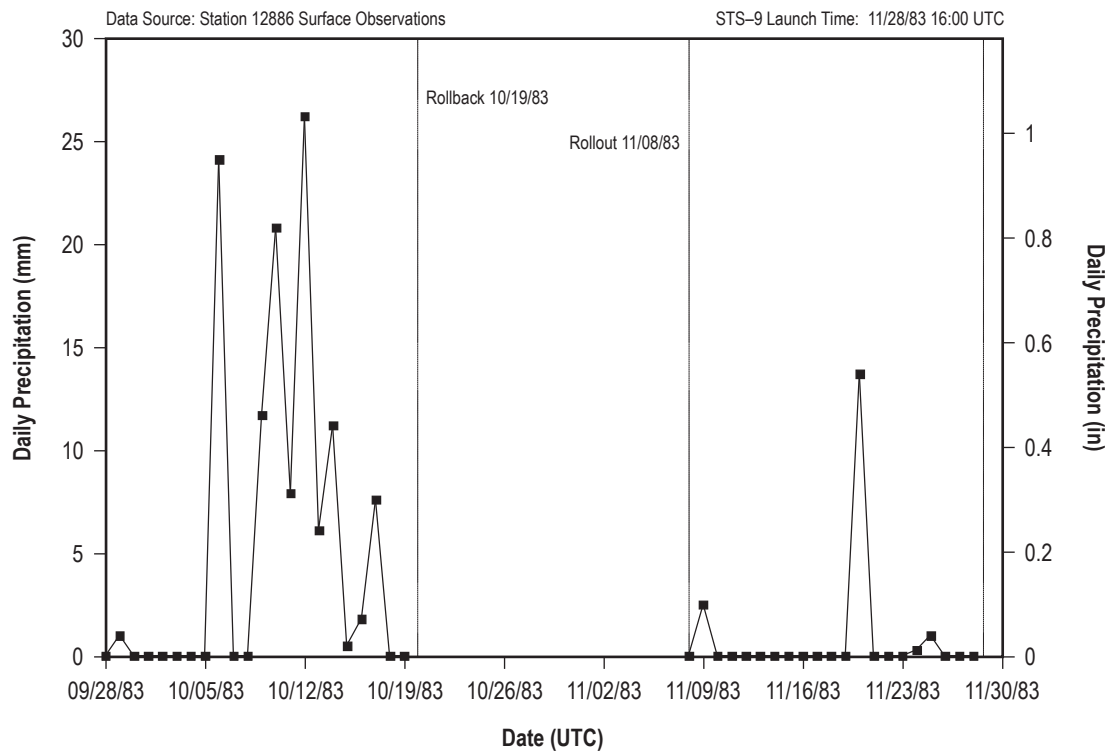


Figure 60. STS-9 daily precipitation totals.

## 5.10 41-B

41-B was the fourth mission for *Challenger* (OV-099). It rolled out to pad 39A on January 12, 1984. 41-B was exposed on the pad for 23 days and launched on February 3, 1984, at 13:00 UTC.

### 5.10.1 41-B Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for 41-B.

### 5.10.2 41-B L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 41-B are shown in table 23. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 23.

Table 23. 41-B L-0 surface observations.

Temperature	16.7 °C (62 °F)
Relative humidity	75%
Sea level pressure	1,018 hPa (30.06 inHg)
Wind speed	0 m/s (0 kt) (1-min average)
Wind direction	0° (1-min average)
Sky condition	2/8 cumulus at 762 m (2,500 ft); 1/8 stratocumulus at 1,372 m (4,500 ft); 0/8 cirrus at 7,620 m (25,000 ft)
Visibility	5.9 km (3.2 nmi)

### 5.10.3 41-B Pad Exposure Period Surface Meteorological Parameters

Figures 61–66 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 41-B pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 24. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 24. 41-B pad exposure period hourly extremes.

Minimum temperature	3.3 °C (38 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	27%
Maximum relative humidity	100%
Minimum sea level pressure	1,010.5 hPa (29.84 inHg)
Maximum sea level pressure	1,029.8 hPa (30.41 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 320°
Total precipitation	53.6 mm (2.11 in)

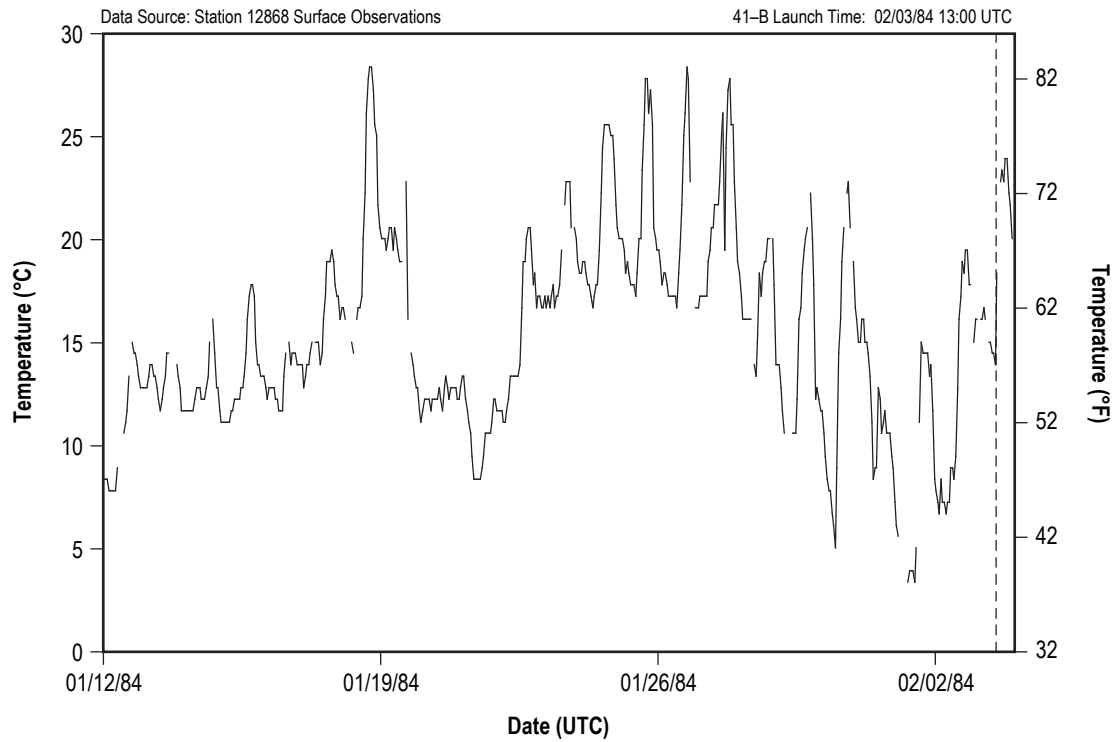


Figure 61. 41-B hourly surface temperature.

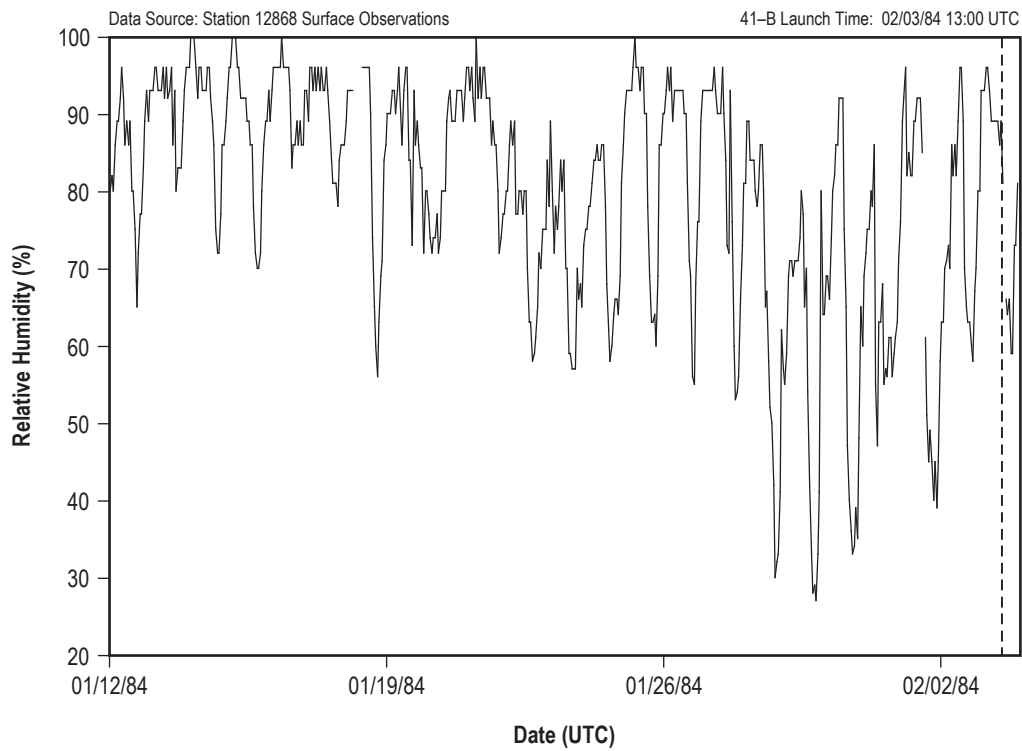


Figure 62. 41-B hourly surface relative humidity.

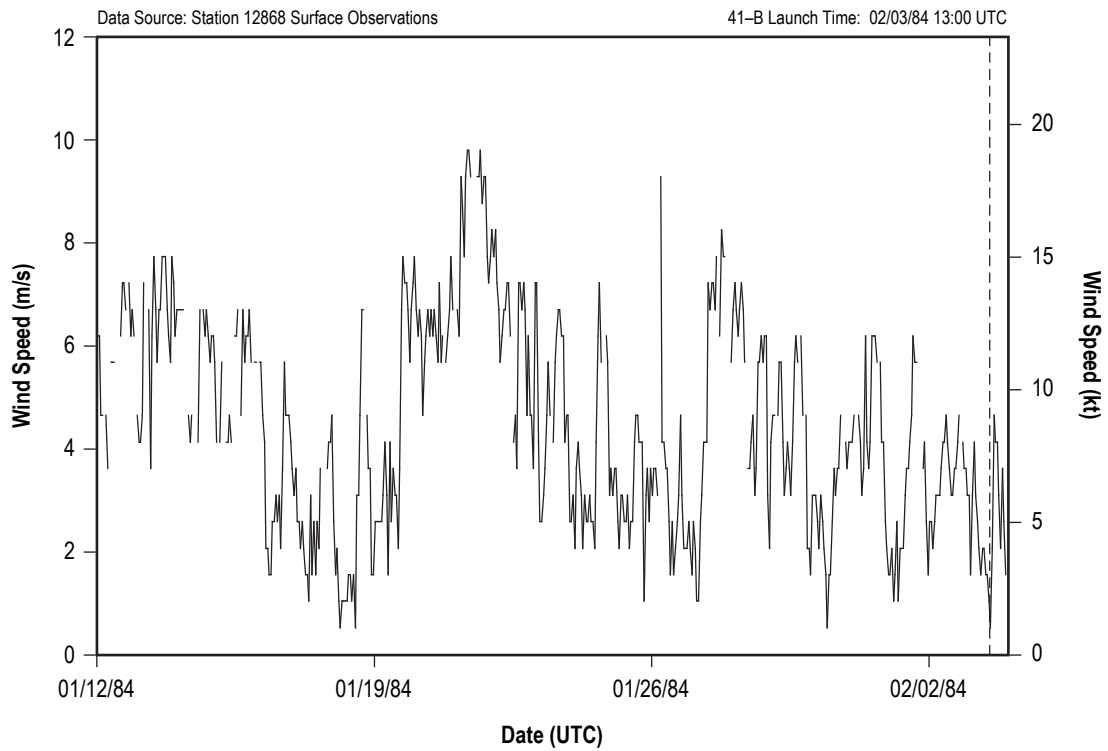


Figure 63. 41-B hourly surface wind speed.

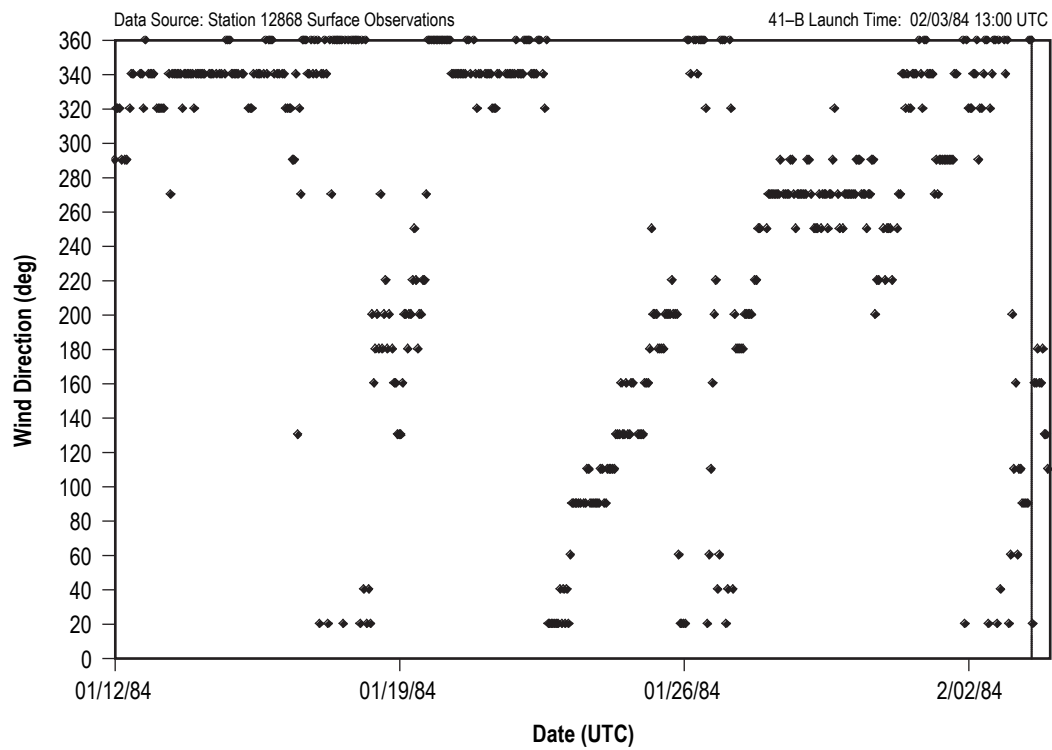


Figure 64. 41-B hourly surface wind direction.



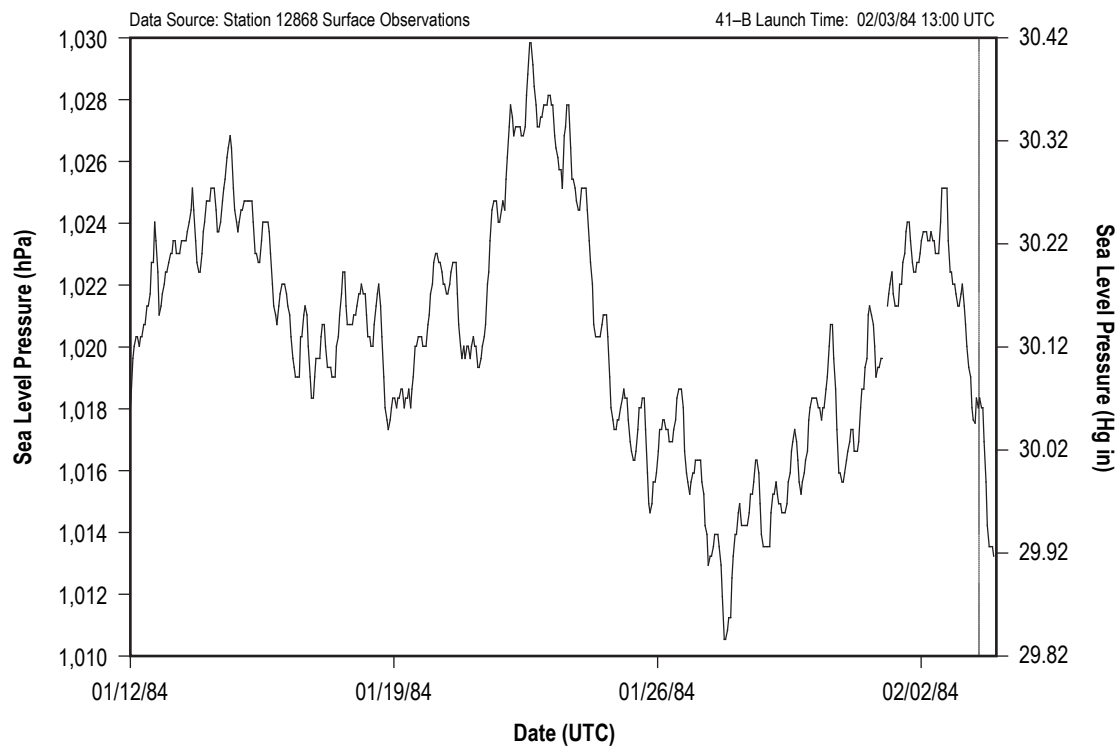


Figure 65. 41-B hourly sea level pressure.

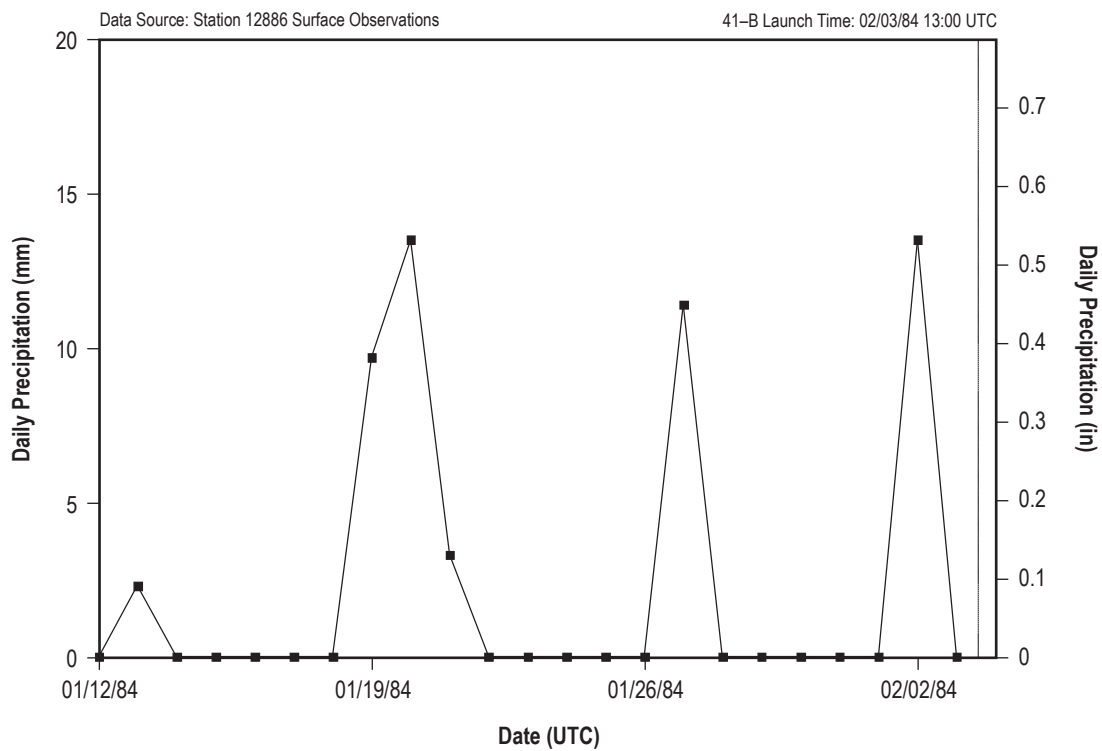


Figure 66. 41-B daily precipitation totals.

## 5.11 41–C

41–C was the fifth mission for *Challenger* (OV–099). It rolled out to pad 39A on March 19, 1984. 41–C was exposed on the pad for 19 days and launched on April 6, 1984, at 13:58 UTC.

### 5.11.1 41–C Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for 41–C.

### 5.11.2 41–C L–0 Surface Observations

The surface meteorological parameters observed at L–0 for 41–C are shown in table 25. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 25.

Table 25. 41–C L–0 surface observations.

Temperature	15.8 °C (60.4 °F)
Relative humidity	56%
Sea level pressure	1,015.6 hPa (29.99 inHg)
Wind speed	6.5 m/s (12.7 kt) (1-min average)
Wind direction	320° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi)

### 5.11.3 41–C Pad Exposure Period Surface Meteorological Parameters

Figures 67–72 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 41–C pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 26. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 26. 41–C pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	25%
Maximum relative humidity	100%
Minimum sea level pressure	994.7 hPa (29.37 inHg)
Maximum sea level pressure	1,022.7 hPa (30.2 inHg)
Maximum wind speed and associated wind direction	13.9 m/s (27 kt) 270°
Total precipitation	92.7 mm (3.65 in)

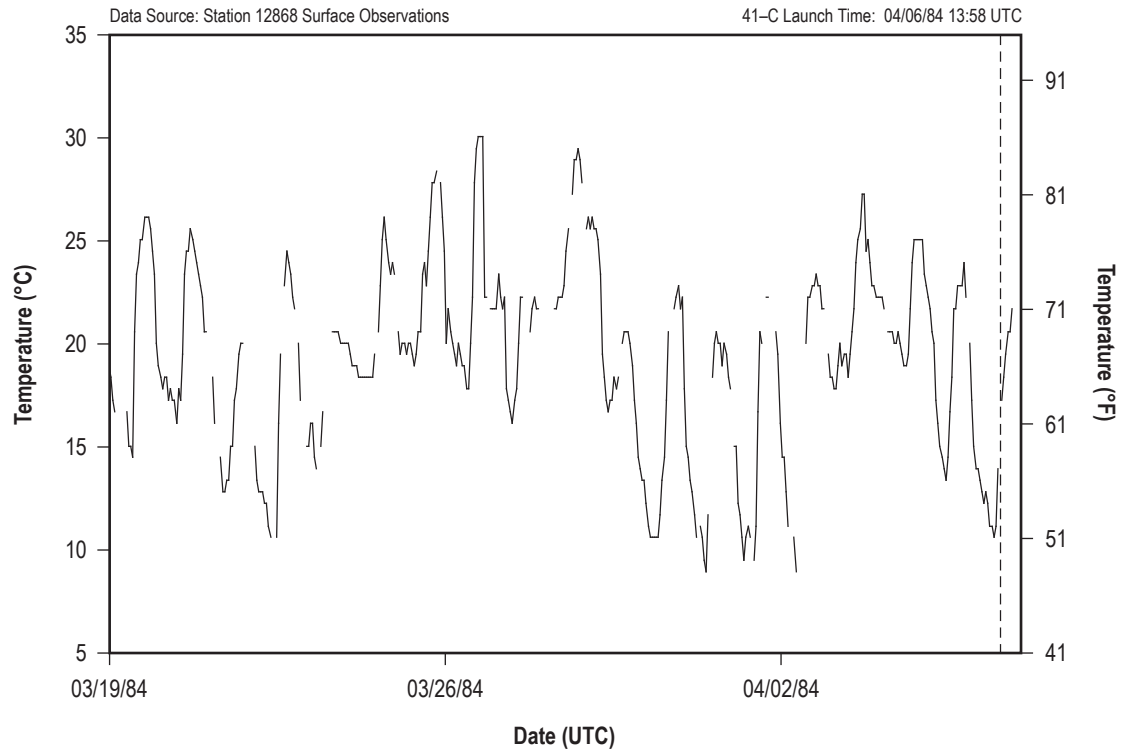


Figure 67. 41-C hourly surface temperature.

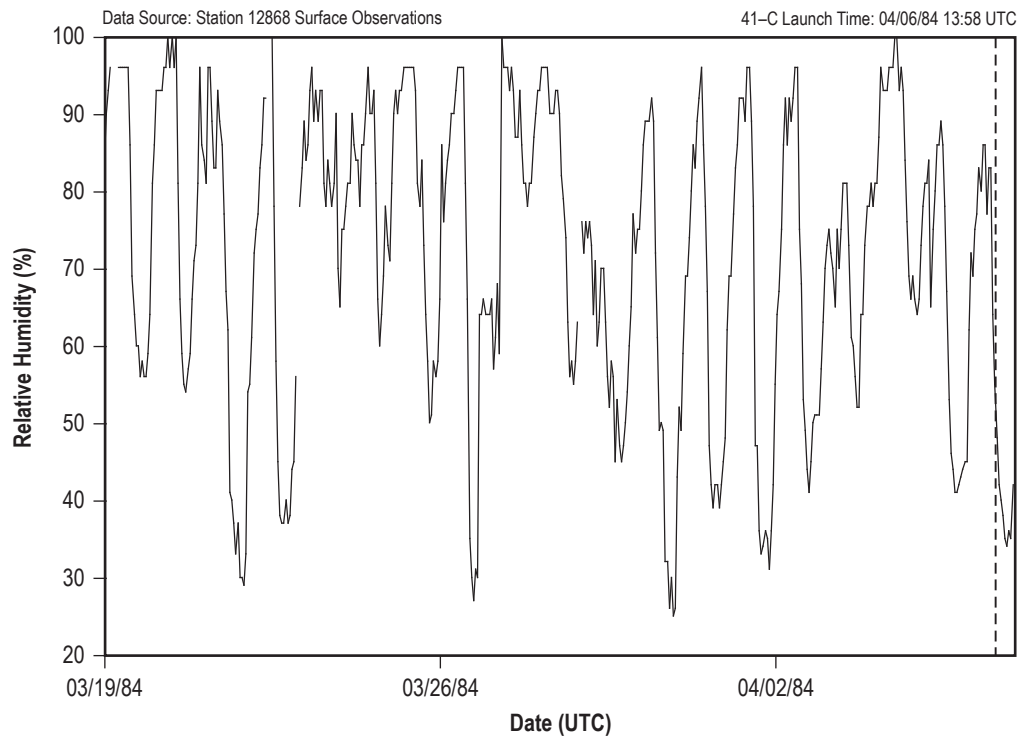


Figure 68. 41-C hourly surface relative humidity.

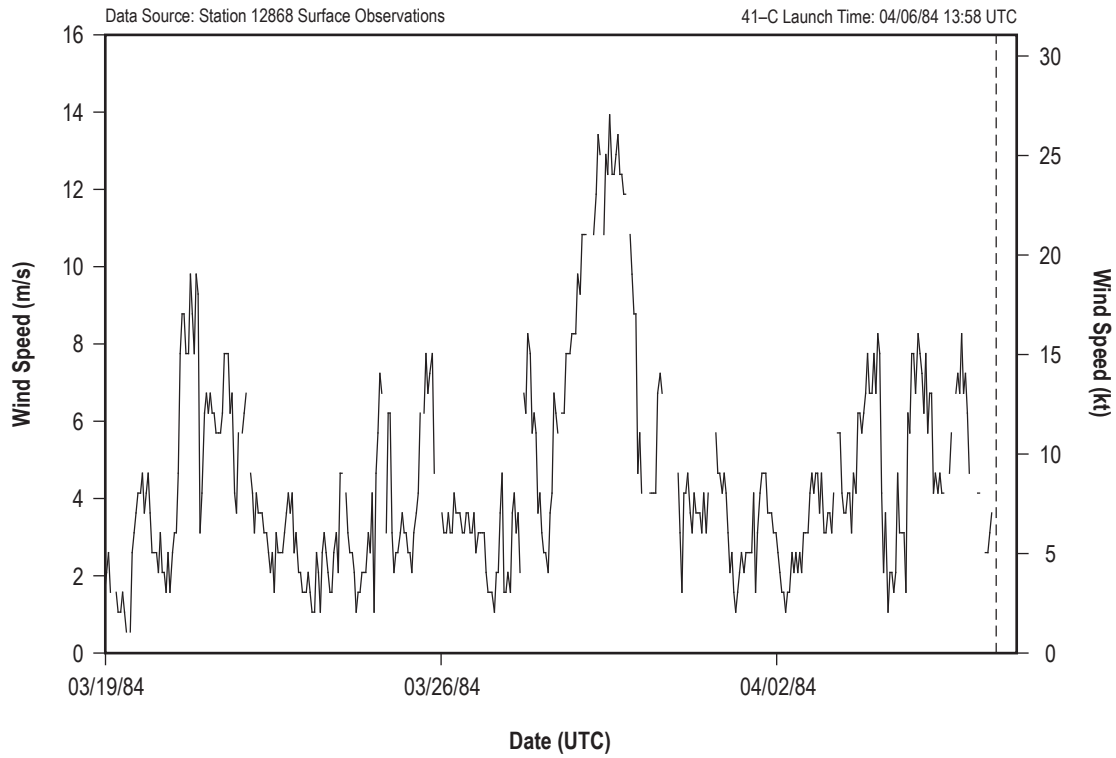


Figure 69. 41-C hourly surface wind speed.

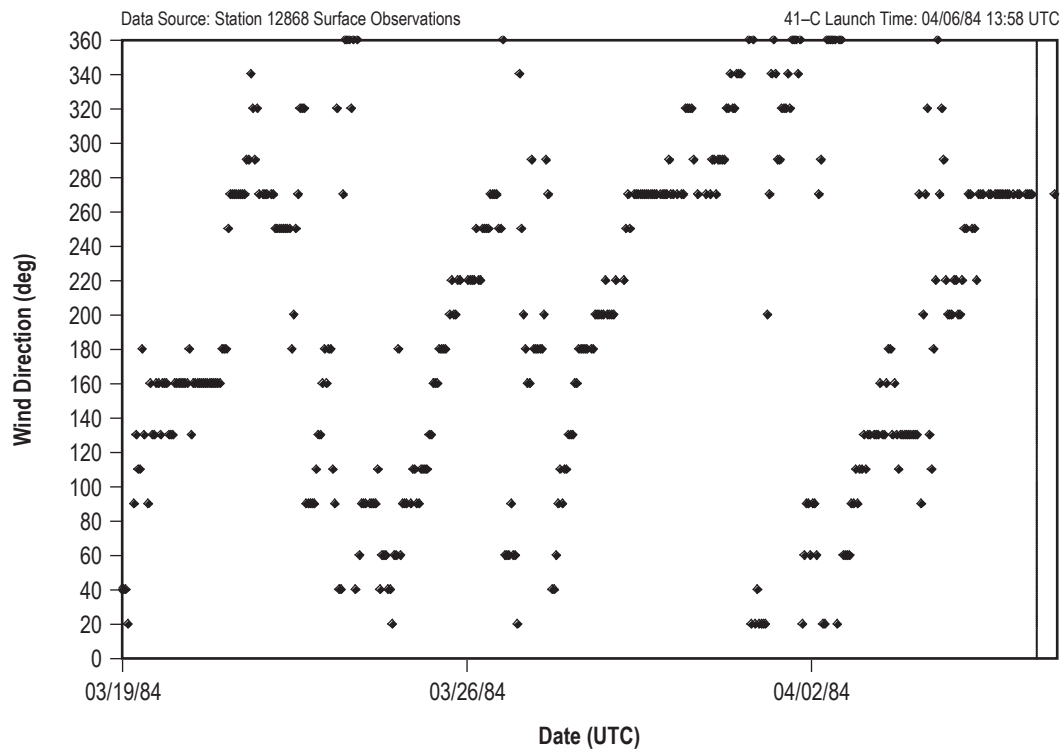


Figure 70. 41-C hourly surface wind direction.

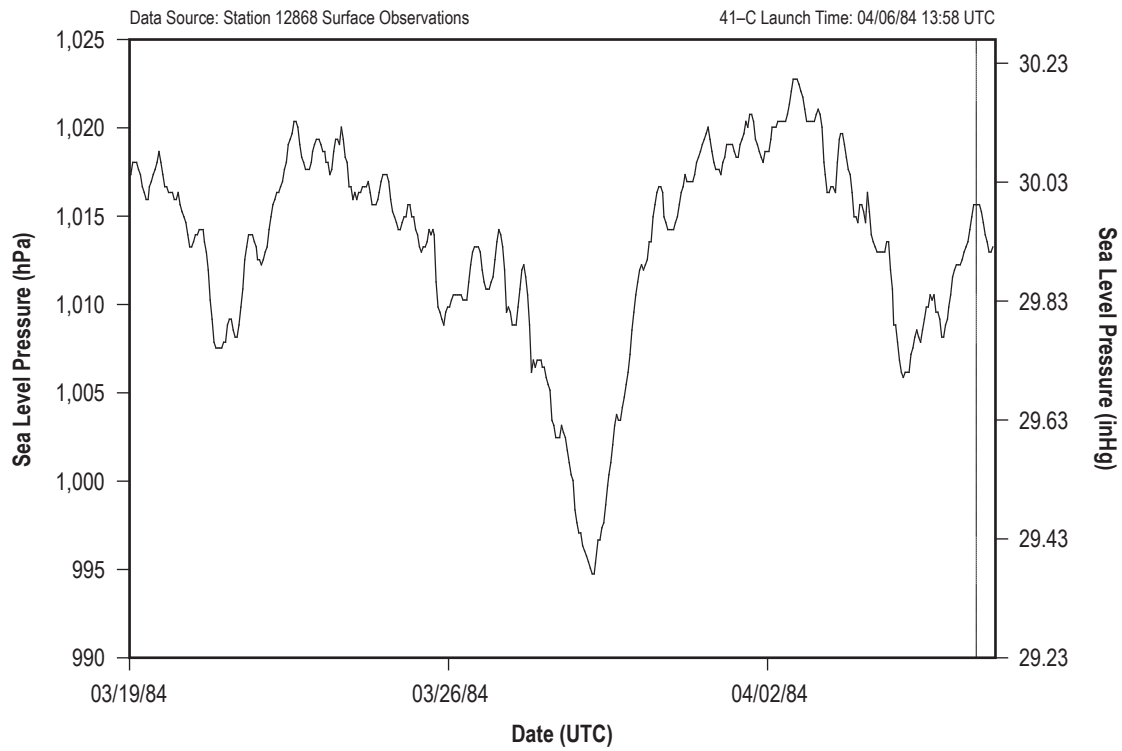


Figure 71. 41-C hourly sea level pressure.

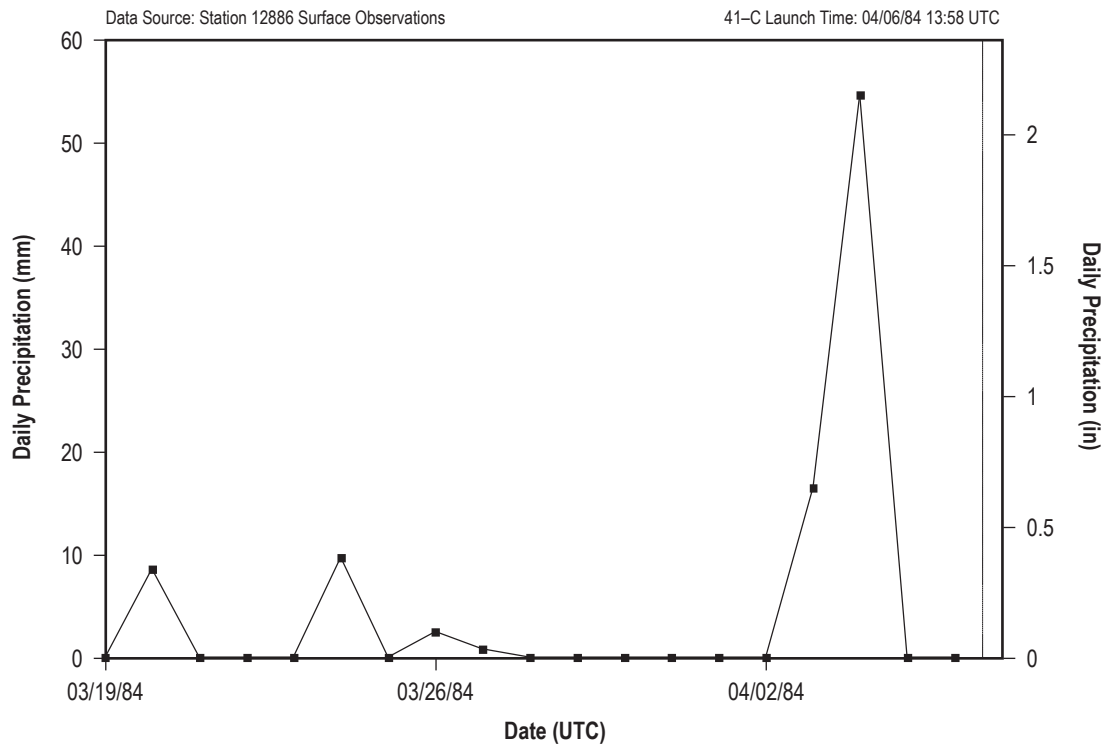


Figure 72. 41-C daily precipitation totals.

## 5.12 41-D

41-D was the first mission for *Discovery* (OV-103). It rolled out to pad 39A for the first time on May 19, 1984. It was rolled back from the pad on July 14, 1984. 41-D rolled out to pad 39A for the second time on August 9, 1984. 41-D was exposed on the pad for a total of 79 days (57 days after the first rollout and 22 days after the second rollout) and launched on August 30, 1984, at 12:42 UTC.

### 5.12.1 41-D Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for 41-D.

### 5.12.2 41-D L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 41-D are shown in table 27. Temperature, relative humidity, and pressure were obtained from pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 27. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 27. 41-D L-0 surface observations.

Temperature	26.2 °C (79.2 °F)
Relative humidity	81%
Sea level pressure	1,018 hPa (30.06 inHg)
Wind speed	0.9 m/s (1.8 kt) (1-min average)
Wind direction	1.6° (1-min average)
Sky condition	1/8 cumulus at 610 m (2,000 ft); 0/8 altocumulus at 1,219 m (4,000 ft); 3/8 cirrus at 9,144 m (30,000 ft.)
Visibility	16.1 km (8.7 nmi)

### 5.12.3 41-D Pad Exposure Period Surface Meteorological Parameters

Figures 73–78 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 41-D pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 28. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 28. 41-D pad exposure period hourly extremes.

Minimum temperature	11.7 °C (53 °F)
Maximum temperature	36.1 °C (97 °F)
Minimum relative humidity	32%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.8 hPa (29.82 inHg)
Maximum sea level pressure	1,023.4 hPa (30.22 inHg)
Maximum wind speed and associated wind direction	8.2 m/s (18 kt) 180°
Total precipitation	404.9 mm (15.94 in)

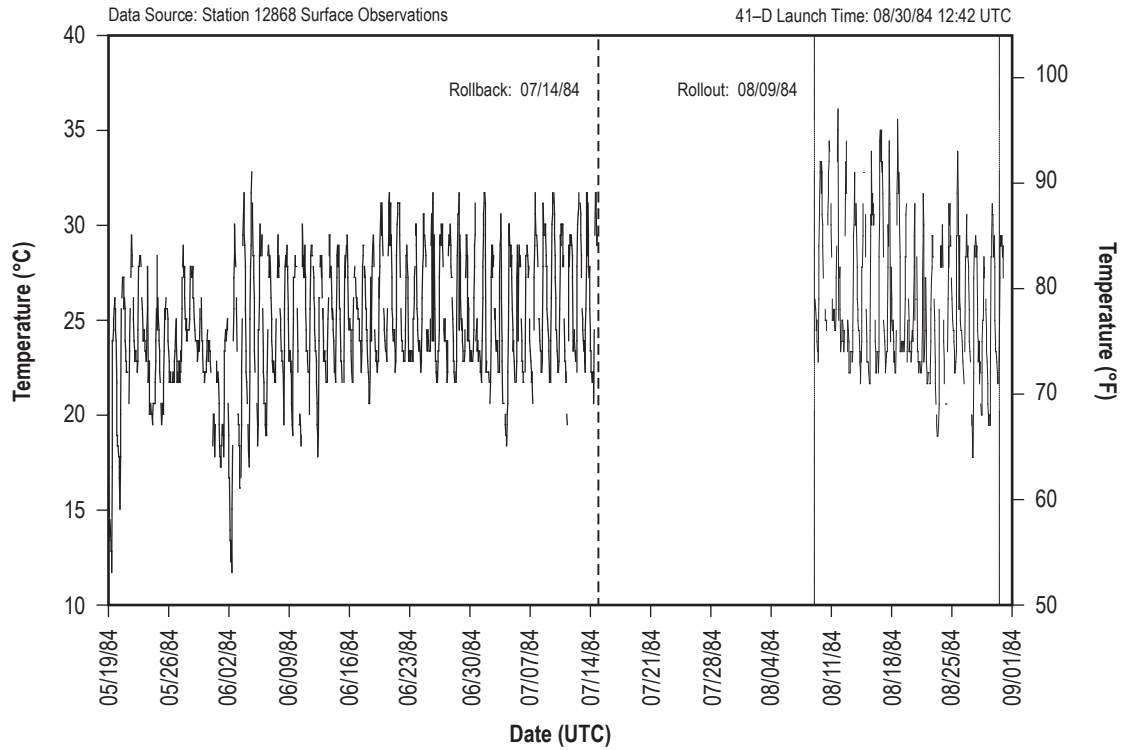


Figure 73. 41-D hourly surface temperature.

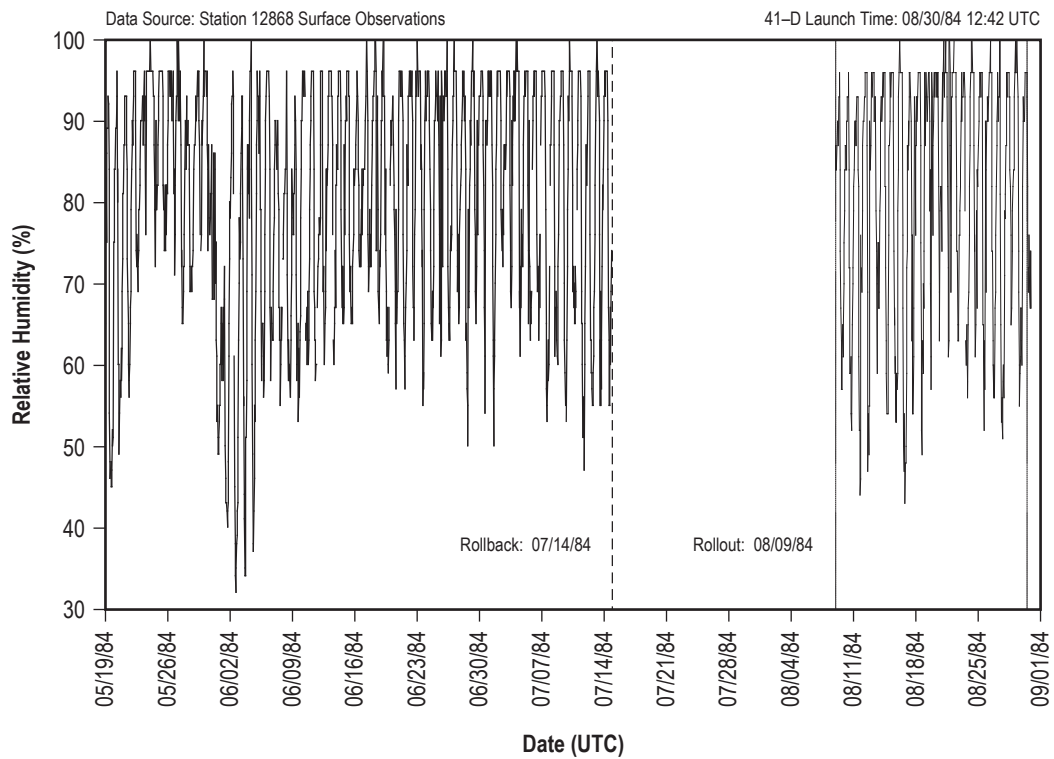


Figure 74. 41-D hourly surface relative humidity.

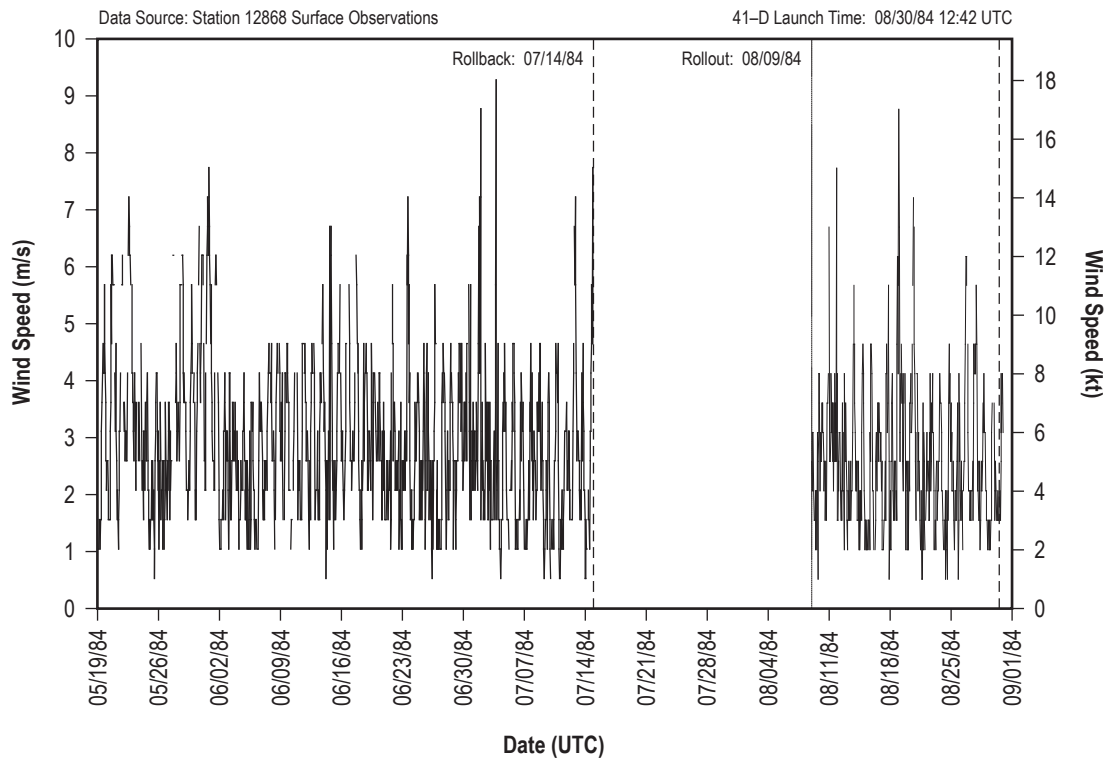


Figure 75. 41-D hourly surface wind speed.

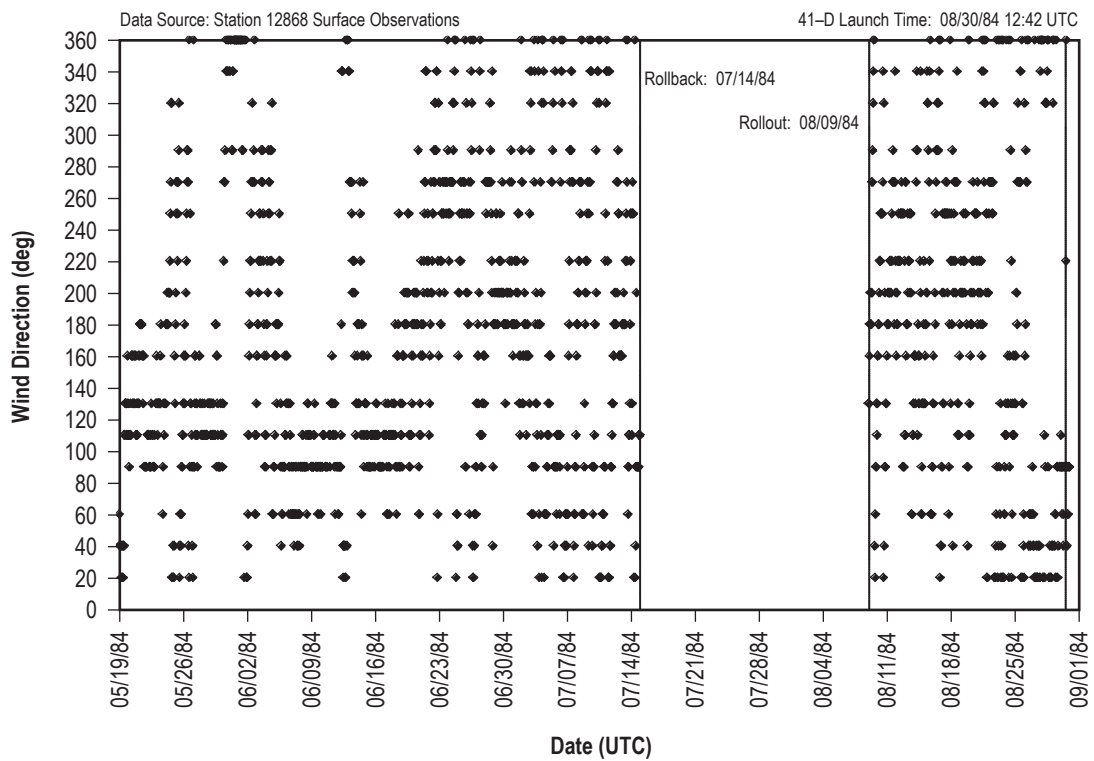


Figure 76. 41-D hourly surface wind direction.



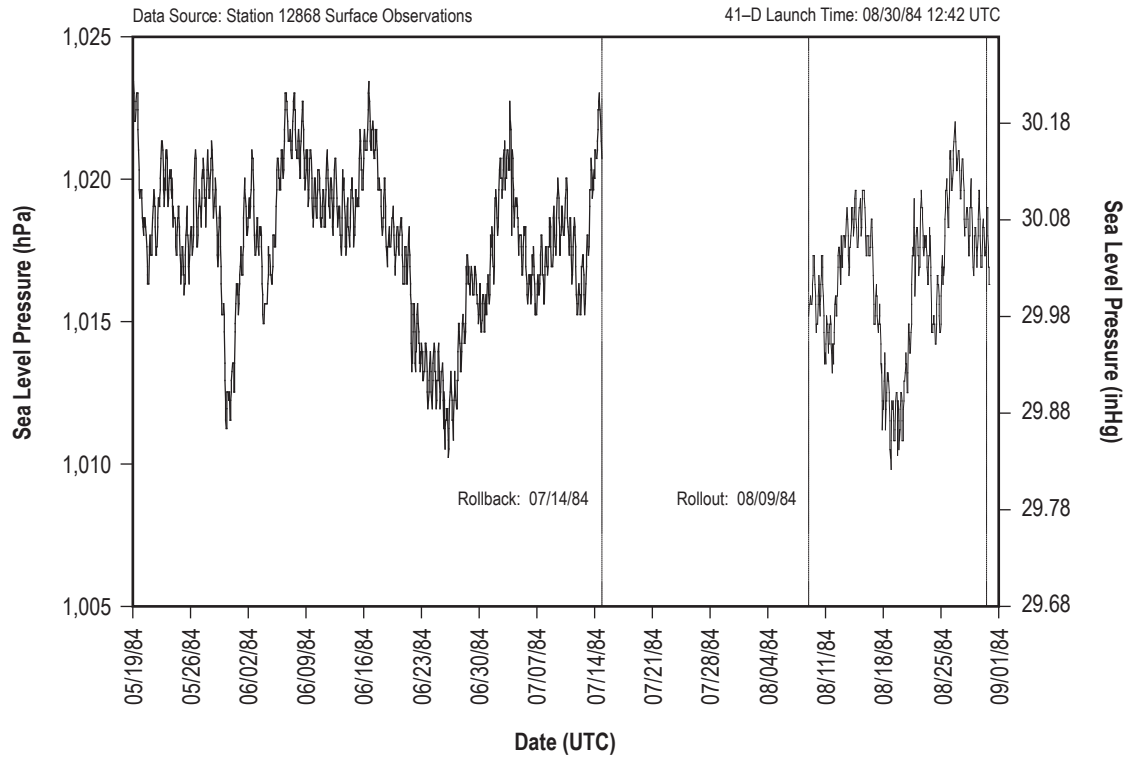


Figure 77. 41-D hourly sea level pressure.

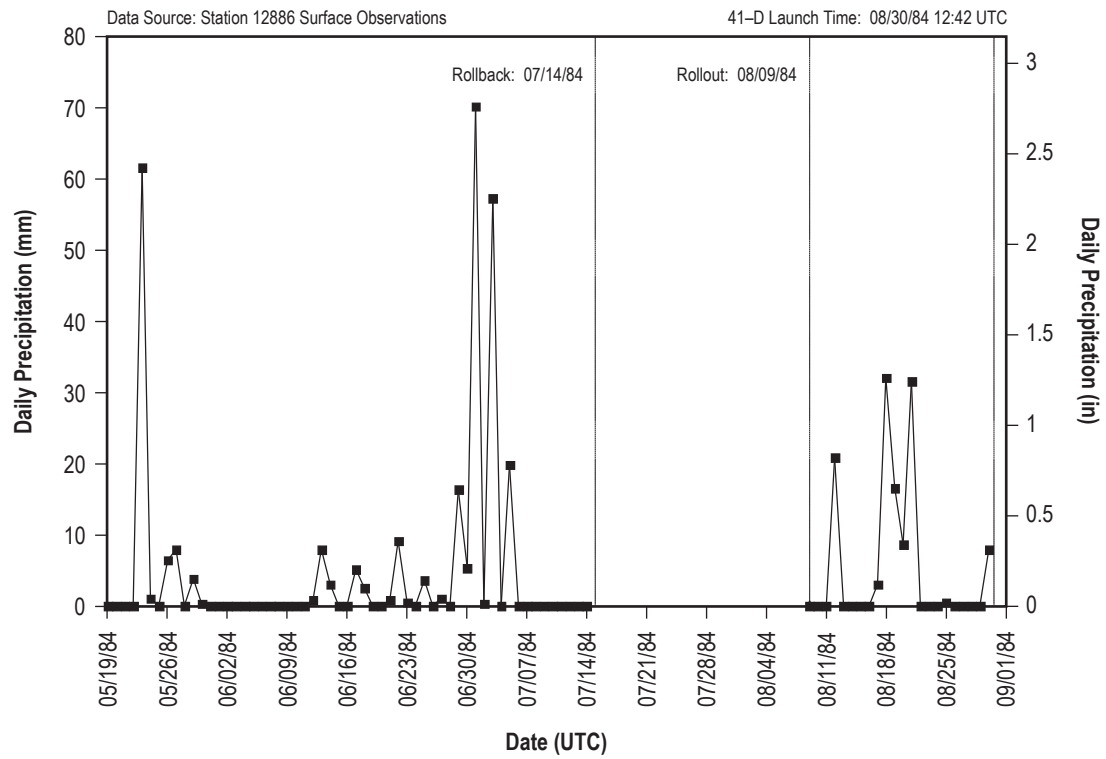


Figure 78. 41-D daily precipitation totals.

## 5.13 41-G

41-G was the sixth mission for *Challenger* (OV-099). It rolled out to pad 39A on September 13, 1984. 41-G was exposed on the pad for 23 days and launched on October 5, 1984, at 11:03 UTC.

### 5.13.1 41-G Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for 41-G.

### 5.13.2 41-G L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 41-G are shown in table 29. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 29.

Table 29. 41-G L-0 surface observations.

Temperature	23.3 °C (74 °F)
Relative humidity	60%
Sea level pressure	1,021.7 hPa (30.17 inHg)
Wind speed	5 m/s (9.8 kt) (1-min average)
Wind direction	73° (1-min average)
Sky condition	5/8 stratocumulus at 1,158 m (3,800 ft); 3/8 cirrus at 10,058 m (33,000 ft)
Visibility	16.1 km (8.7 mi)

### 5.13.3 41-G Pad Exposure Period Surface Meteorological Parameters

Figures 79–84 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 41-G pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 30. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 30. 41-G pad exposure period hourly extremes.

Minimum temperature	14.4 °C (58 °F)
Maximum temperature	33.3 °C (92 °F)
Minimum relative humidity	44%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,023.4 hPa (30.22 inHg)
Maximum wind speed and associated wind direction	12.9 m/s (25 kt) 90°
Total precipitation	85.6 mm (3.37 in)

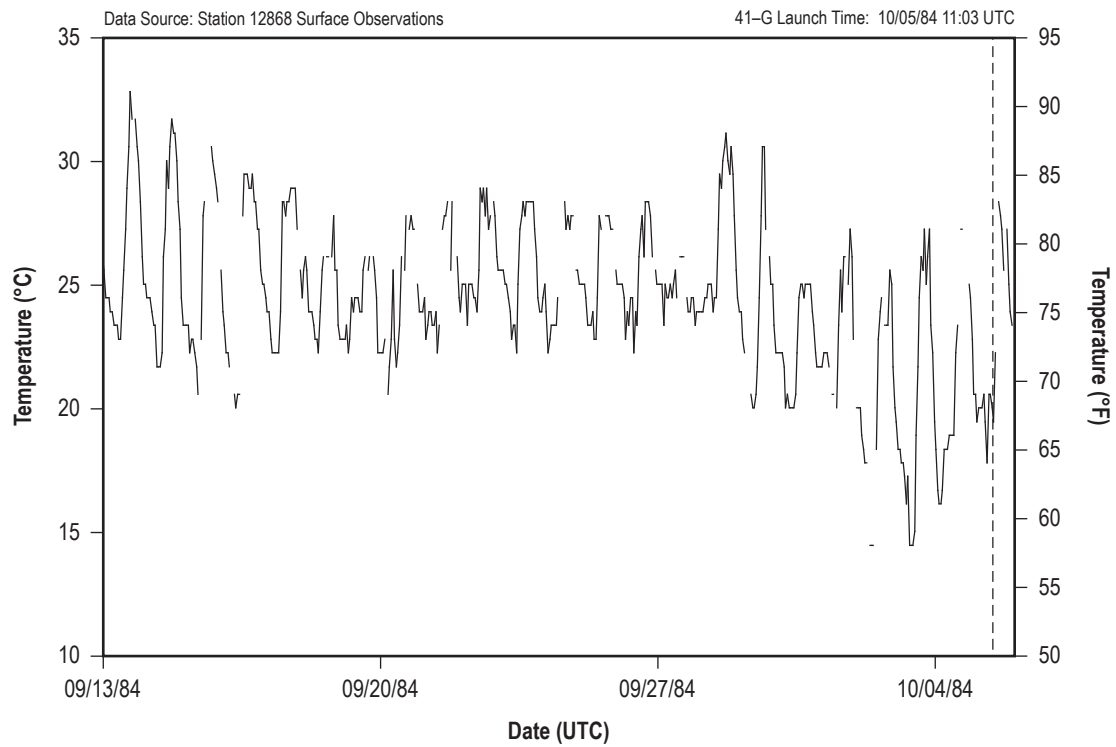


Figure 79. 41-G hourly surface temperature.

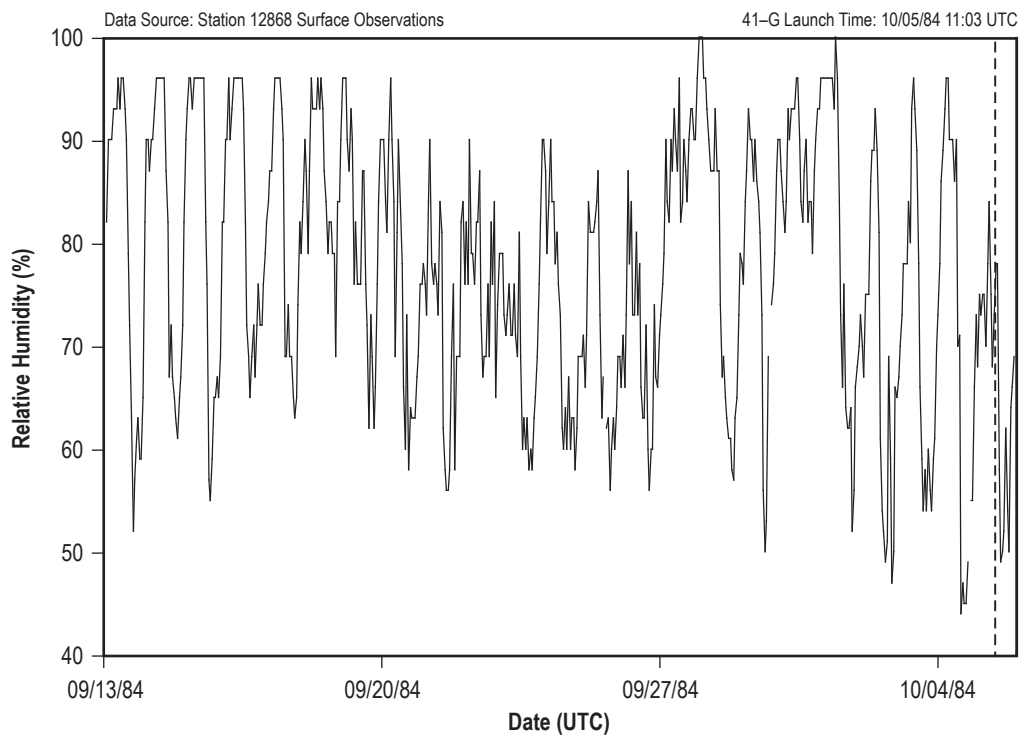


Figure 80. 41-G hourly surface relative humidity.

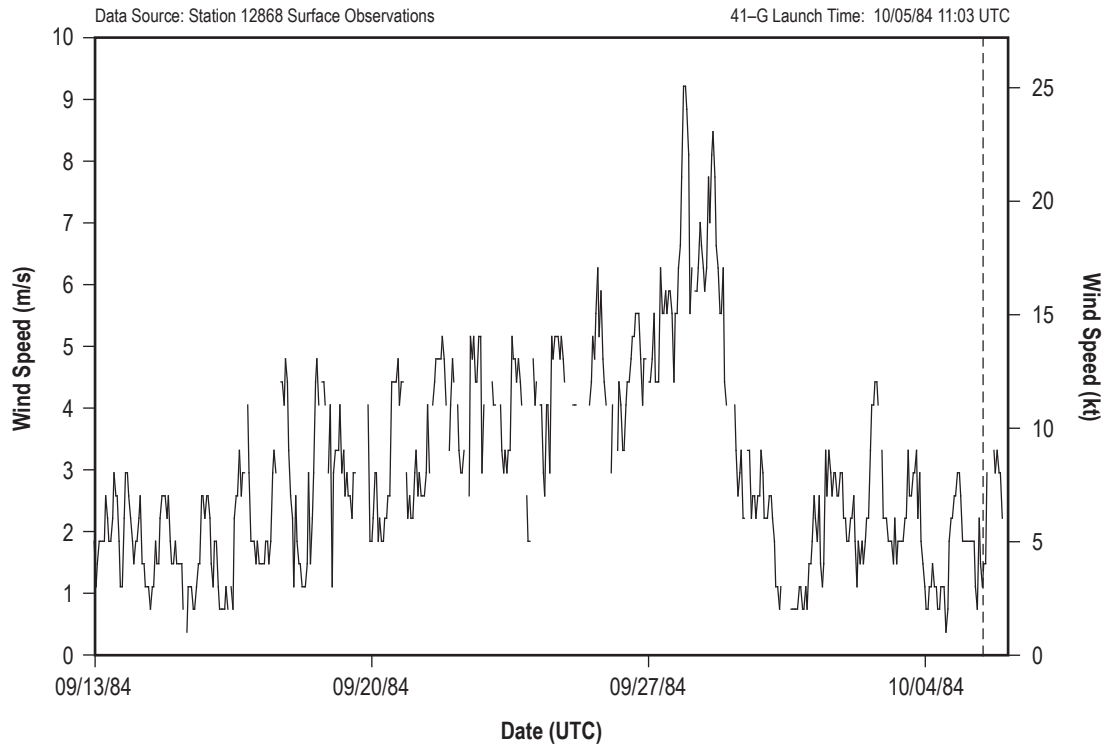


Figure 81. 41-G hourly surface wind speed.

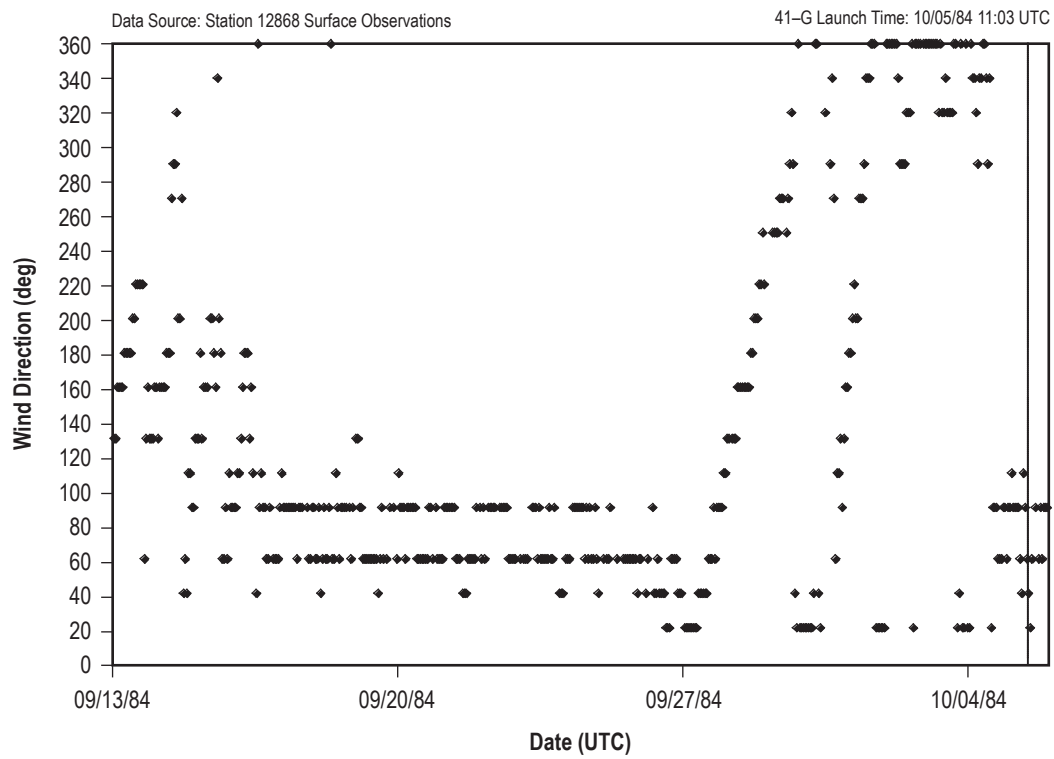


Figure 82. 41-G hourly surface wind direction.

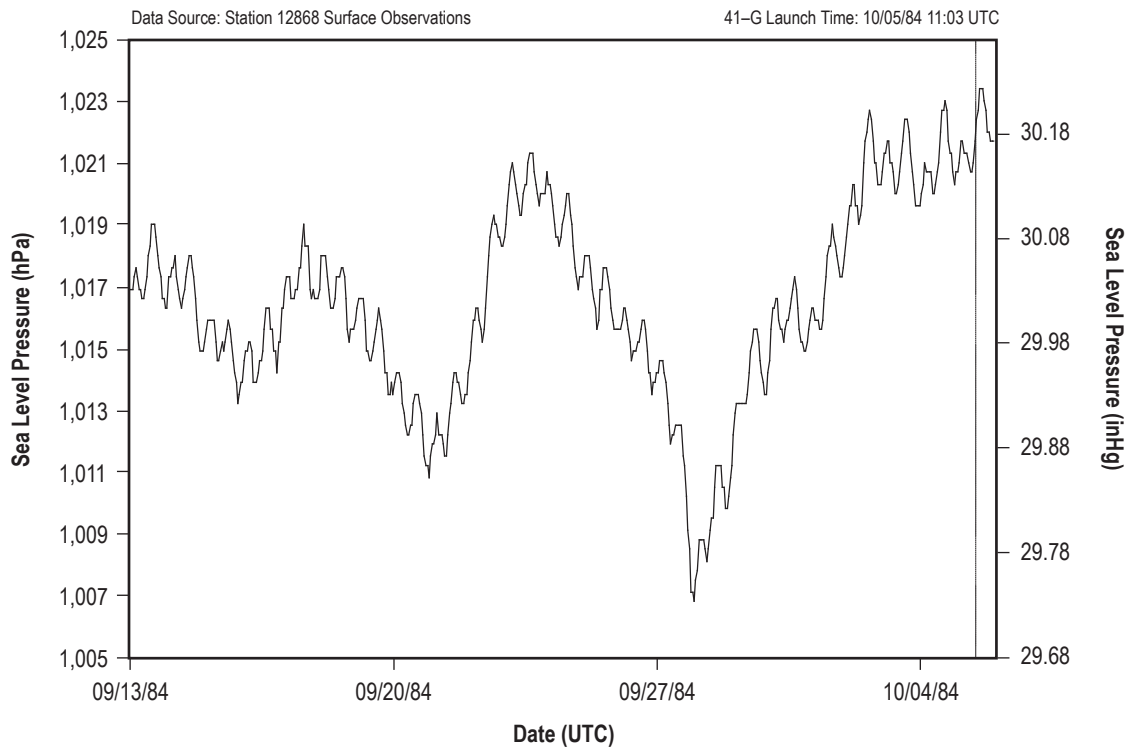


Figure 83. 41-G hourly sea level pressure.

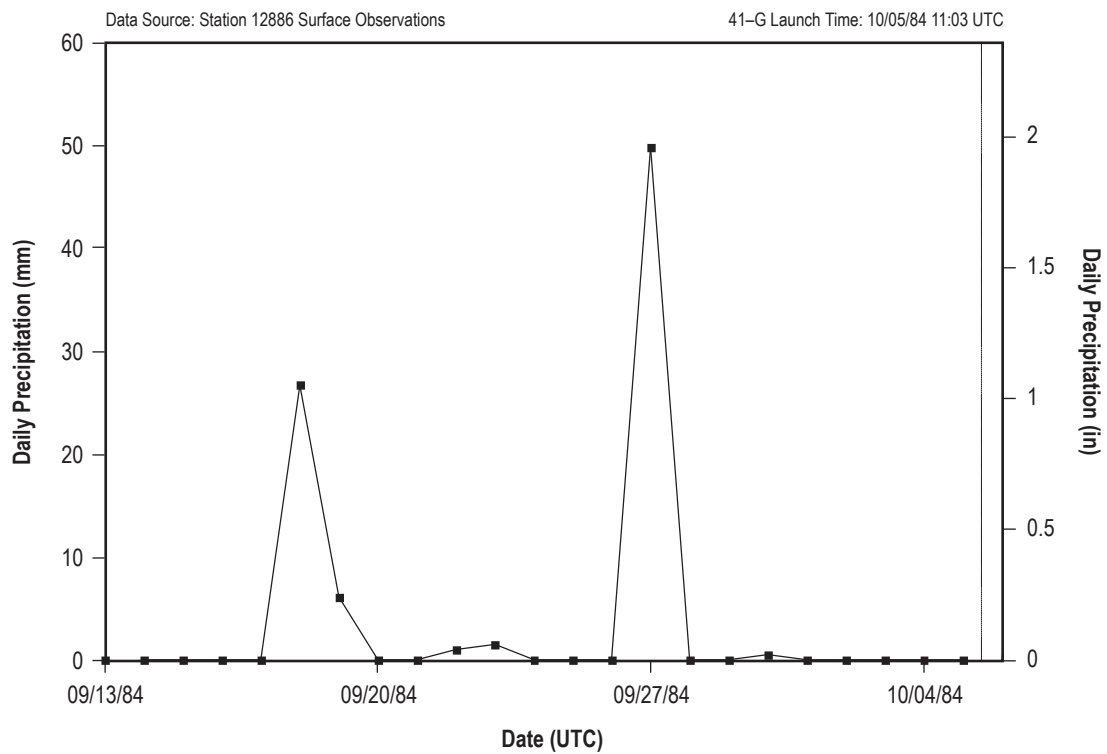


Figure 84. 41-G daily precipitation totals.

## 5.14 51-A

51-A was the second mission for *Discovery* (OV-103). It rolled out to pad 39A on October 23, 1984. 51-A was exposed on the pad for 17 days and launched on November 8, 1984, at 12:15 UTC.

### 5.14.1 51-A Pad Exposure Period Data Archive Sources

Only data from station 12868 have been archived for the pad exposure period for 51-A.

### 5.14.2 51-A L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-A are shown in table 31. Temperature was measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Relative humidity, pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 31.

Table 31. 51-A L-0 surface observations.

Temperature	19.9 °C (67.9 °F)
Relative humidity	64%
Sea level pressure	1,023.4 hPa (30.22 inHg)
Wind speed	7 m/s (13.6 kt) (1-min average)
Wind direction	24° (1-min average)
Sky condition	2/8 cumulus at 762 m (2,500 ft); 3/8 stratocumulus at 1,158 m (3,800 ft)
Visibility	16.1 km (8.7 nmi)

### 5.14.3 51-A Pad Exposure Period Surface Meteorological Parameters

Figures 85–90 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-A pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 32. All data in this section were collected at station 12868, except for precipitation, which was measured at station 12886.

Table 32. 51-A pad exposure period hourly extremes.

Minimum temperature	11.1 °C (52 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	39%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.5 hPa (29.81 inHg)
Maximum sea level pressure	1,025.4 hPa (30.28 inHg)
Maximum wind speed and associated wind direction	8.2 m/s (16 kt) 90°
Total precipitation	108 mm (4.25 in)

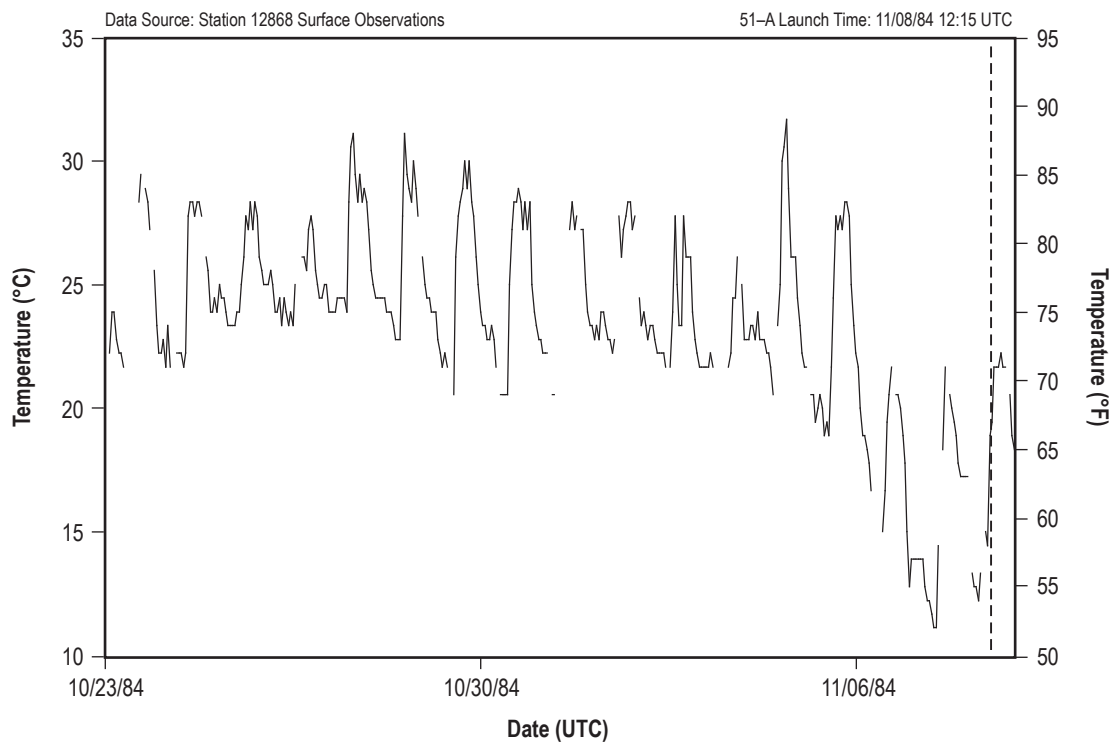


Figure 85. 51-A hourly surface temperature.

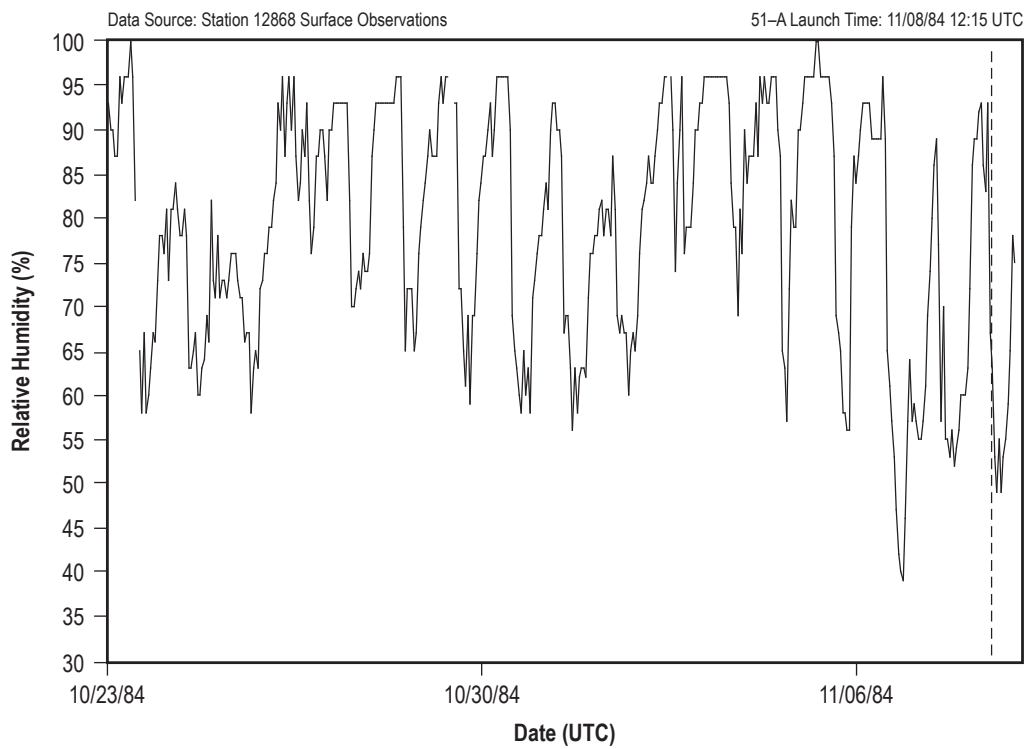


Figure 86. 51-A hourly surface relative humidity.

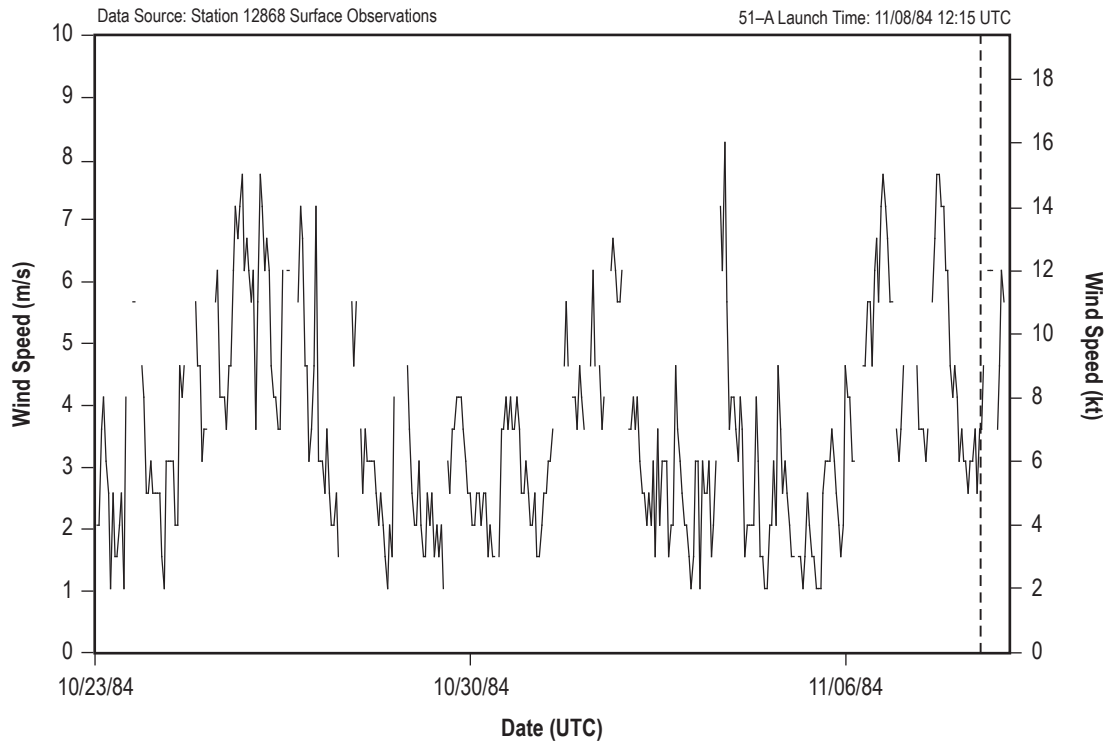


Figure 87. 51-A hourly surface wind speed.

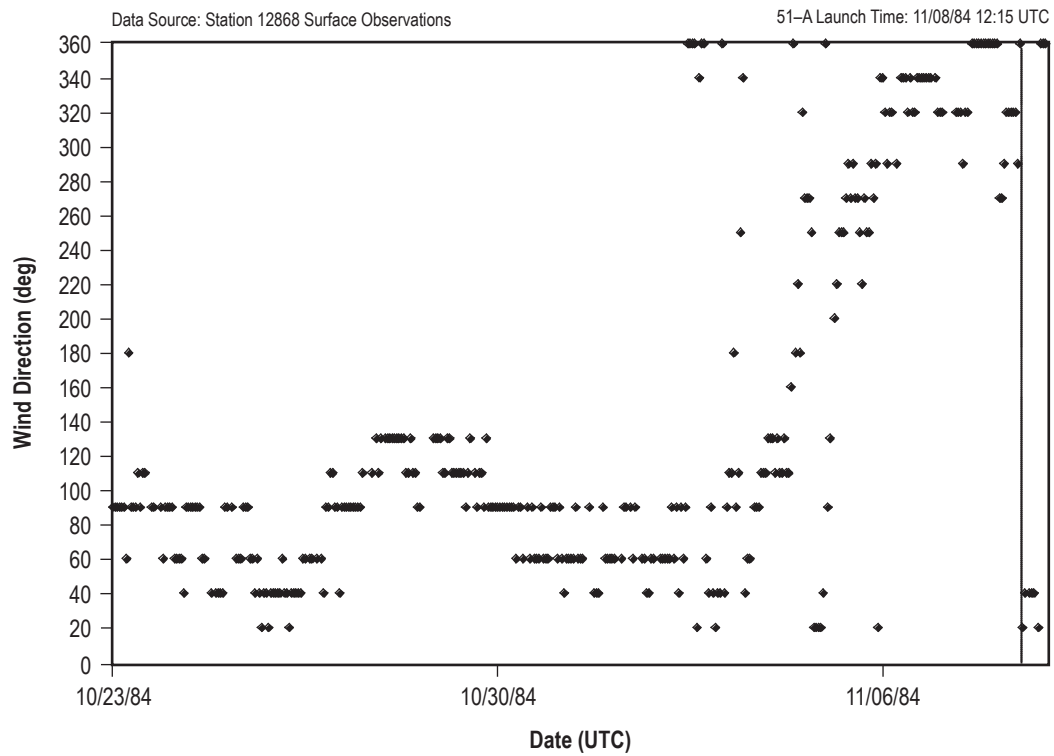


Figure 88. 51-A hourly surface wind direction.



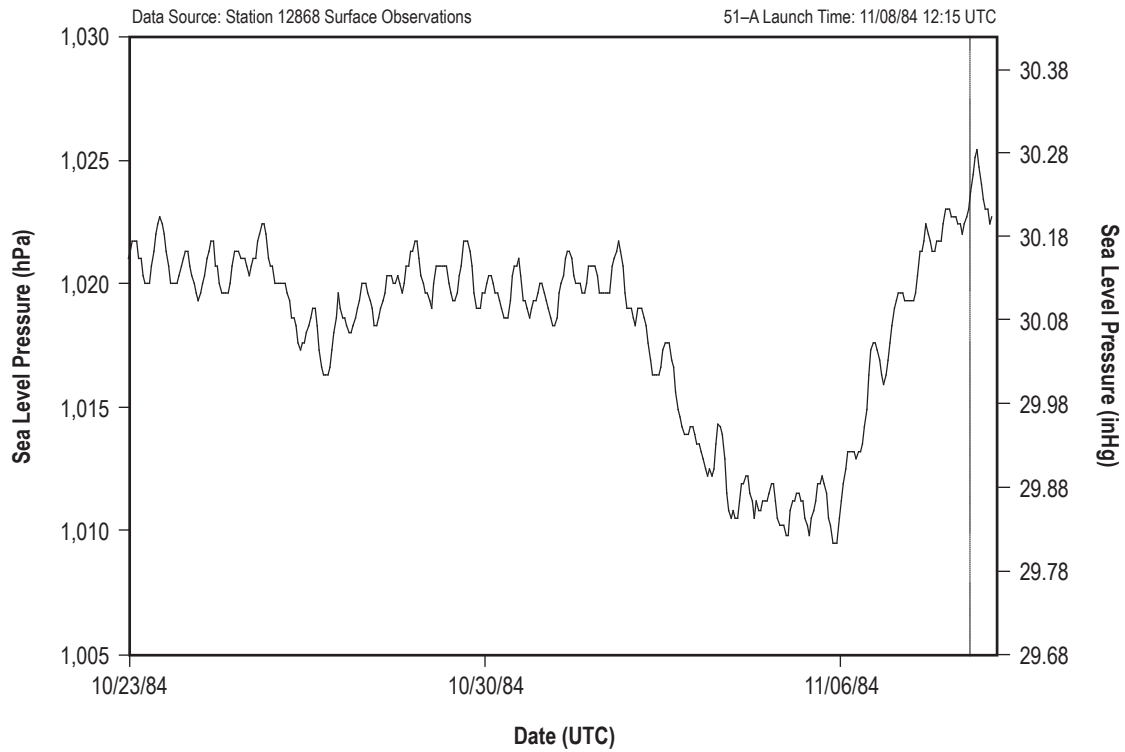


Figure 89. 51-A hourly sea level pressure.

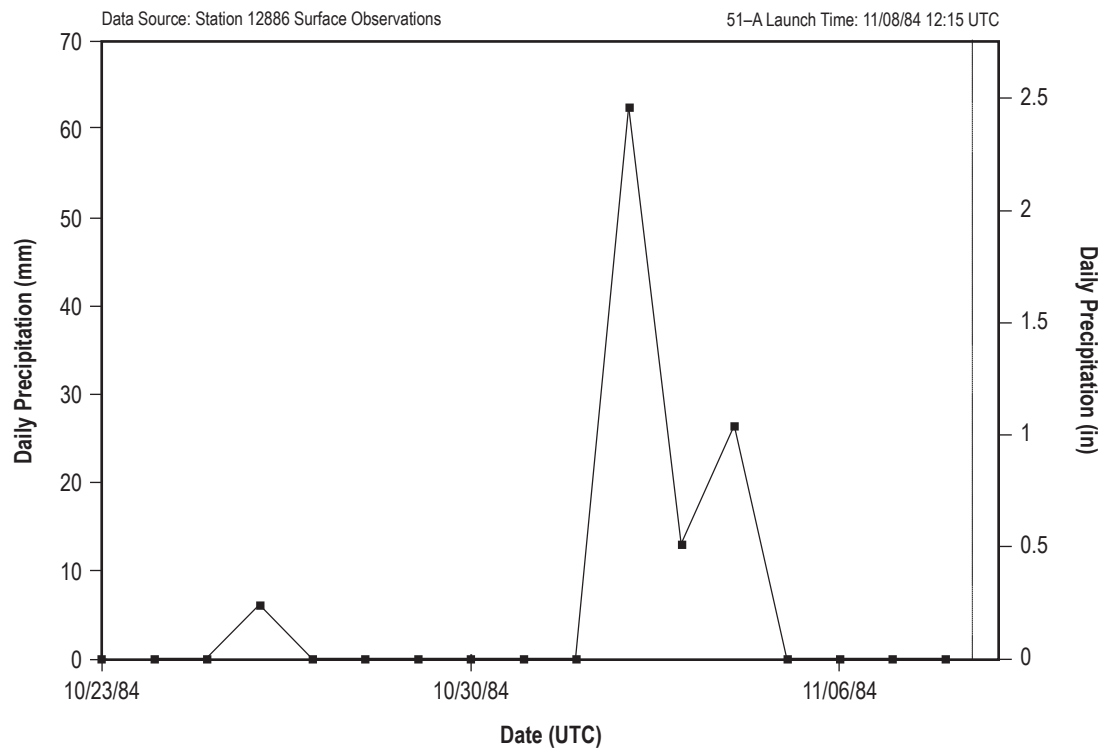


Figure 90. 51-A daily precipitation totals.

## 5.15 51-C

51-C was the third mission for *Discovery* (OV-103). It rolled out to pad 39A on January 5, 1985. 51-C was exposed on the pad for 20 days and launched on January 24, 1985, at 19:50 UTC.

### 5.15.1 51-C Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-C.

### 5.15.2 51-C L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-C are shown in table 33. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 33.

Table 33. 51-C L-0 surface observations.

Temperature	17.7 °C (63.8 °F)
Relative humidity	46%
Sea level pressure	1,018 hPa (30.06 inHg)
Wind speed	5.2 m/s (10.1 kt) (1-min average)
Wind direction	228° (1-min average)
Sky condition	2/8 stratocumulus at 1,219 m (4,000 ft); 1/8 cirrus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.15.3 51-C Pad Exposure Period Surface Meteorological Parameters

Figures 91–96 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-C pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 34. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 34. 51-C pad exposure period hourly extremes.

Minimum temperature	–6.1 °C (21 °F)
Maximum temperature	26.7 °C (80 °F)
Minimum relative humidity	26%
Maximum relative humidity	100%
Minimum sea level pressure	1,010.5 hPa (29.84 inHg)
Maximum sea level pressure	1,028.8 hPa (30.38 inHg)
Maximum wind speed and associated wind direction	8.8 m/s (17 kt) 330°
Total precipitation	2.3 mm (0.09 in)

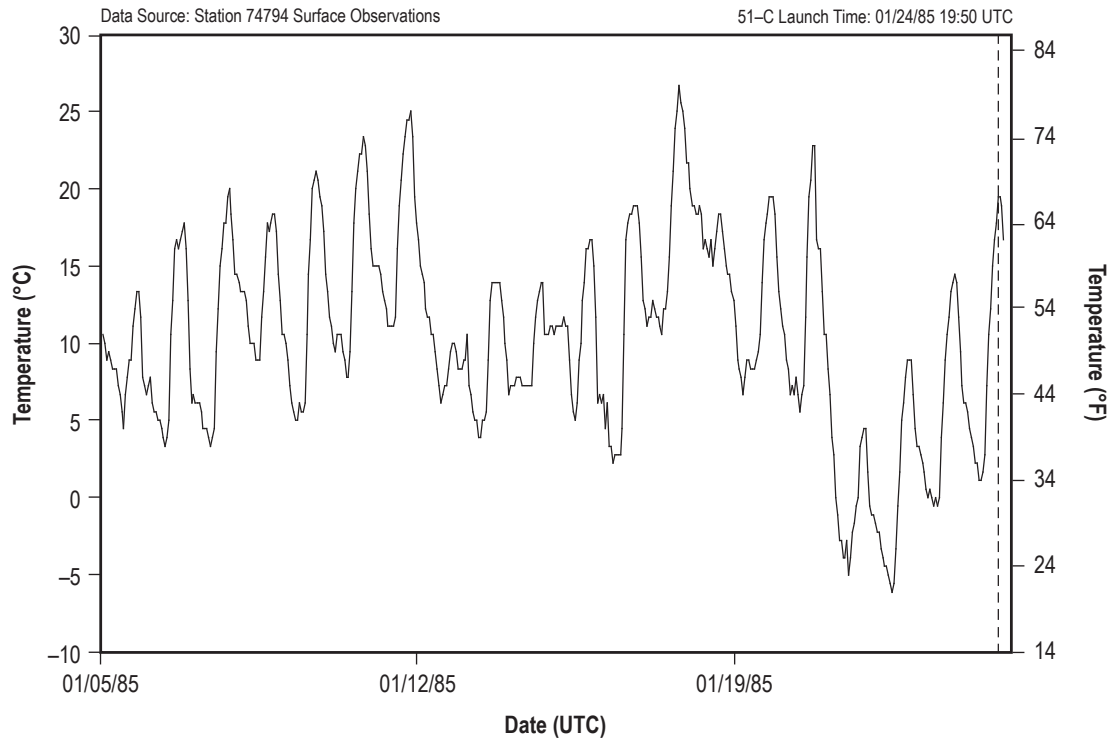


Figure 91. 51-C hourly surface temperature.

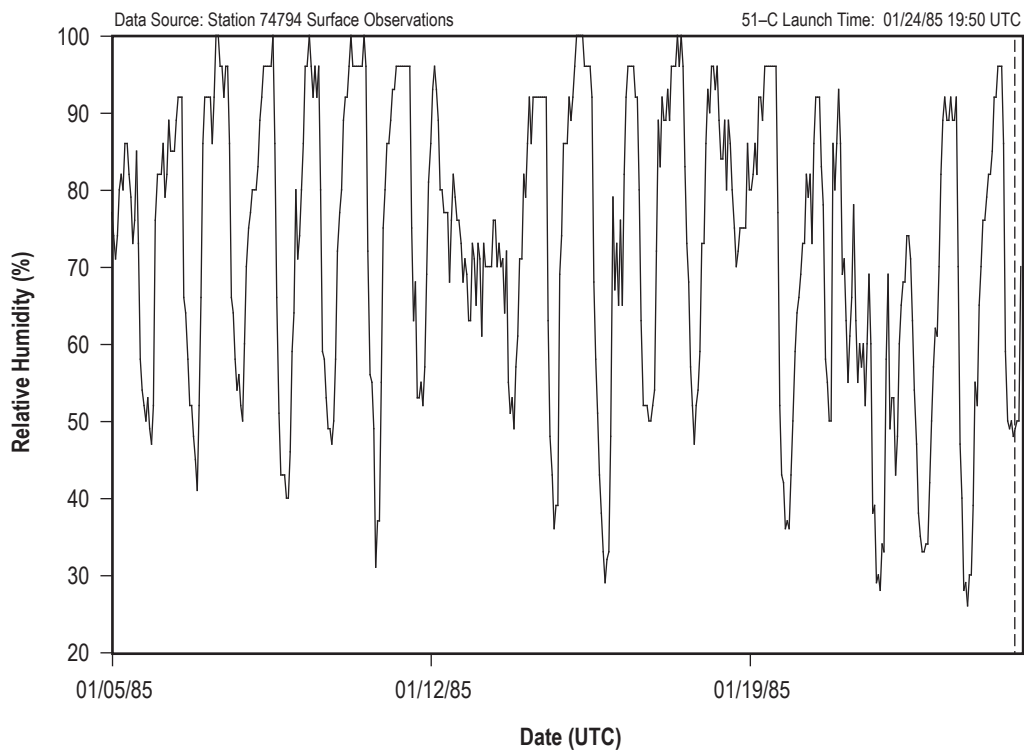


Figure 92. 51-C hourly surface relative humidity.

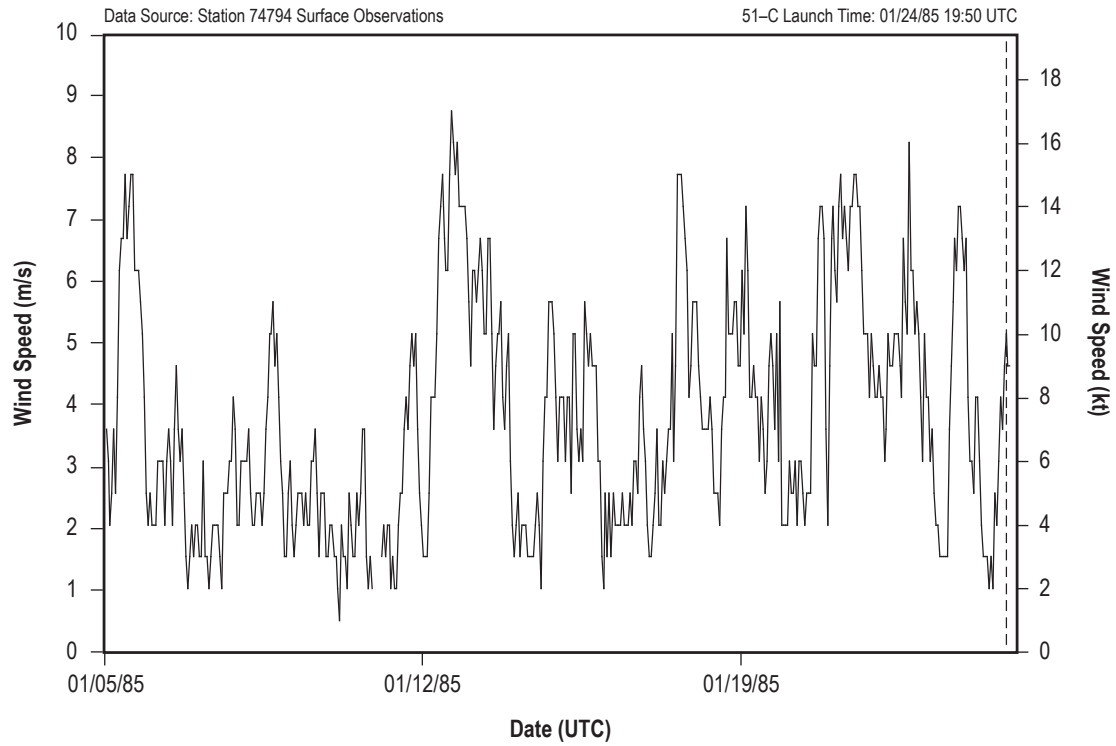


Figure 93. 51-C hourly surface wind speed.

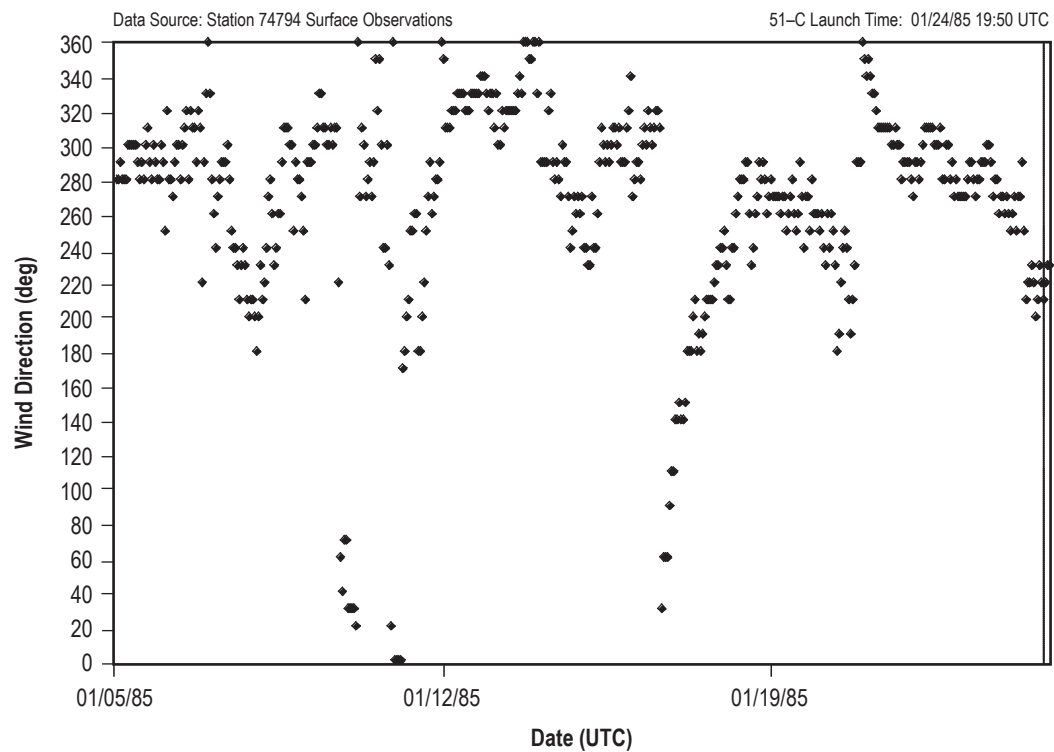


Figure 94. 51-C hourly surface wind direction.

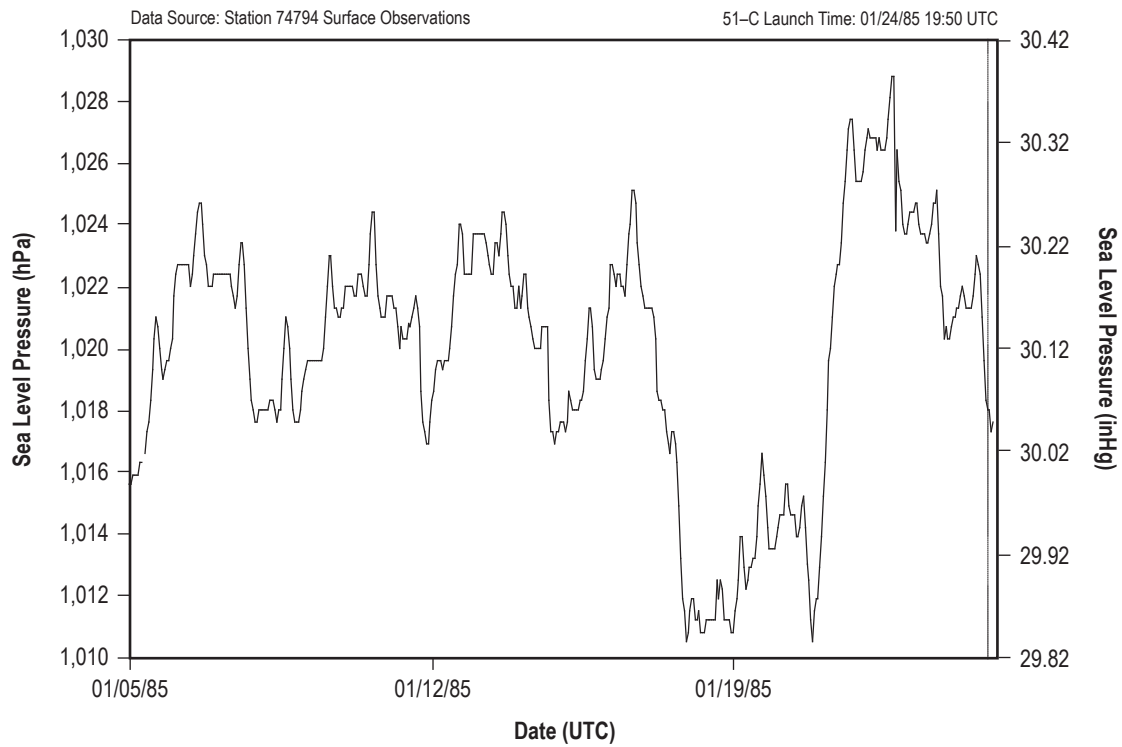


Figure 95. 51-C hourly sea level pressure.

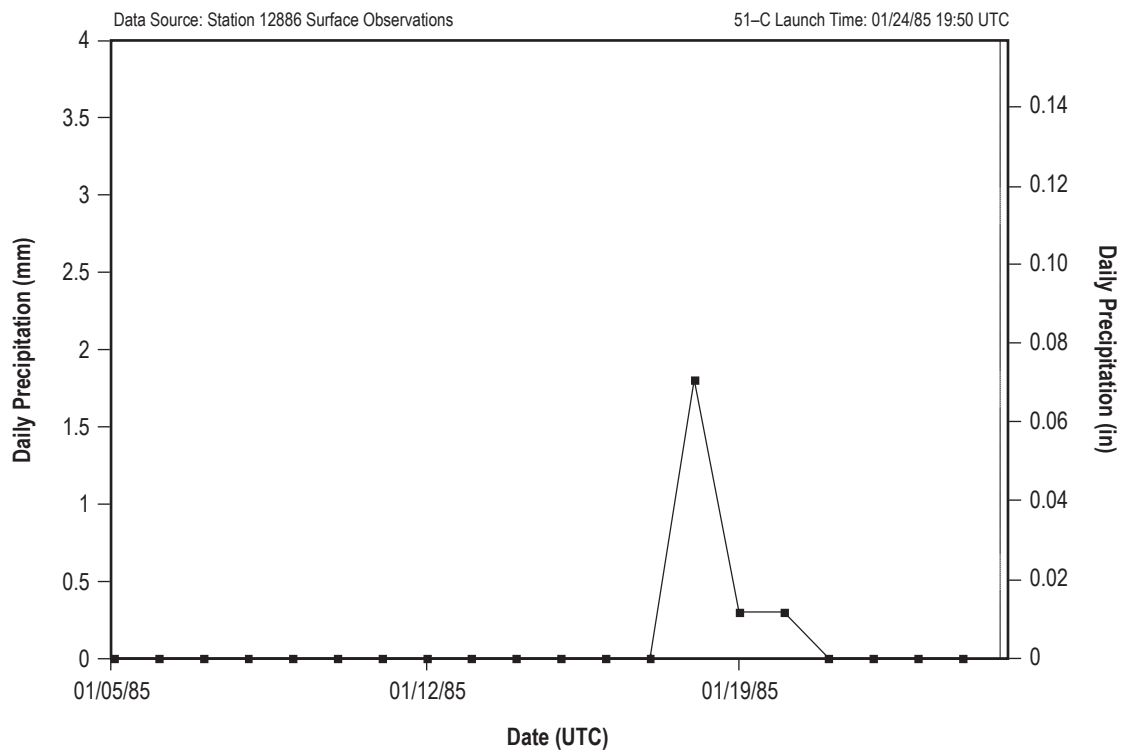


Figure 96. 51-C daily precipitation totals.

## 5.16 51-D

51-D was the fourth mission for *Discovery* (OV-103). It rolled out to pad 39A on March 28, 1985. 51-D was exposed on the pad for 16 days and launched on April 12, 1985, at 13:59 UTC.

### 5.16.1 51-D Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-D.

### 5.16.2 51-D L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-D are shown in table 35. Temperature and relative humidity were measured at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 35.

Table 35. 51-D L-0 surface observations.

Temperature	20.7 °C (69.2 °F)
Relative humidity	55%
Sea level pressure	1,026.4 hPa (30.31 inHg)
Wind speed	6.1 m/s (11.8 kt) (1-min average)
Wind direction	82° (1-min average)
Sky condition	1/8 altocumulus at 2,438 m (8,000 ft); 8/8 altostratus at 4,572 m (15,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.16.3 51-D Pad Exposure Period Surface Meteorological Parameters

Figures 97–102 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-D pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 36. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 36. 51-D pad exposure period hourly extremes.

Minimum temperature	7.2 °C (45 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	28%
Maximum relative humidity	100%
Minimum sea level pressure	1,013.2 hPa (29.92 inHg)
Maximum sea level pressure	1,027.1 hPa (30.33 inHg)
Maximum wind speed and associated wind direction	10.3 m/s (20 kt) 150°
Total precipitation	10.2 mm (0.40 in)

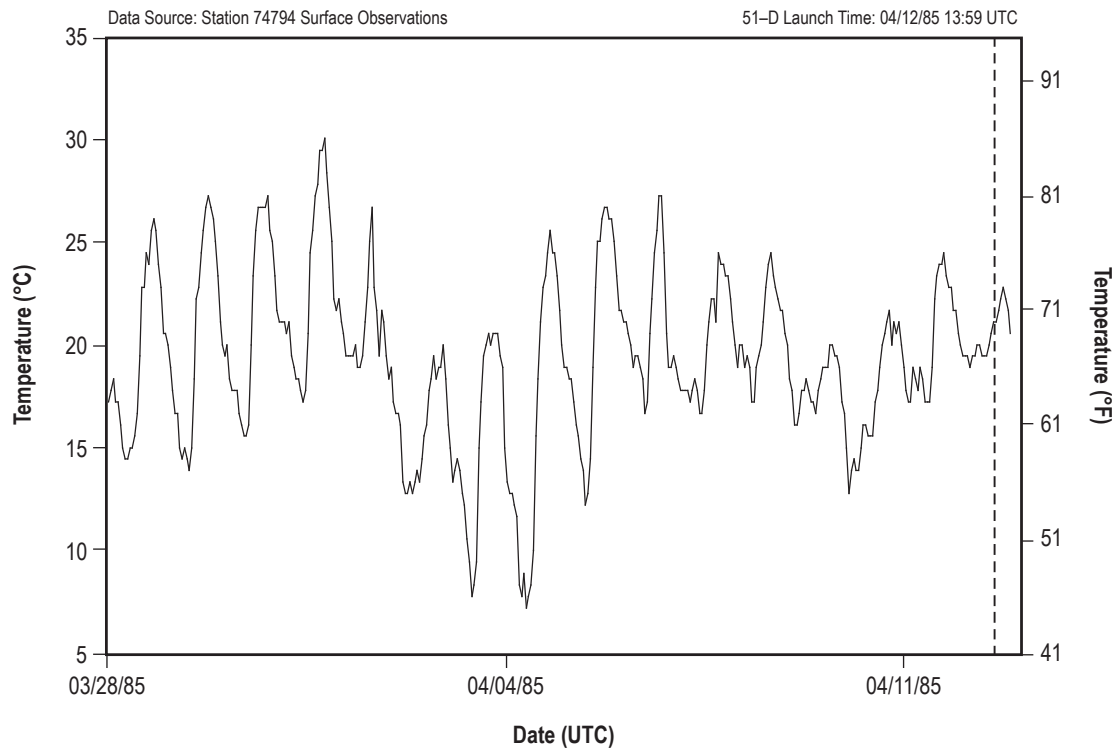


Figure 97. 51-D hourly surface temperature.

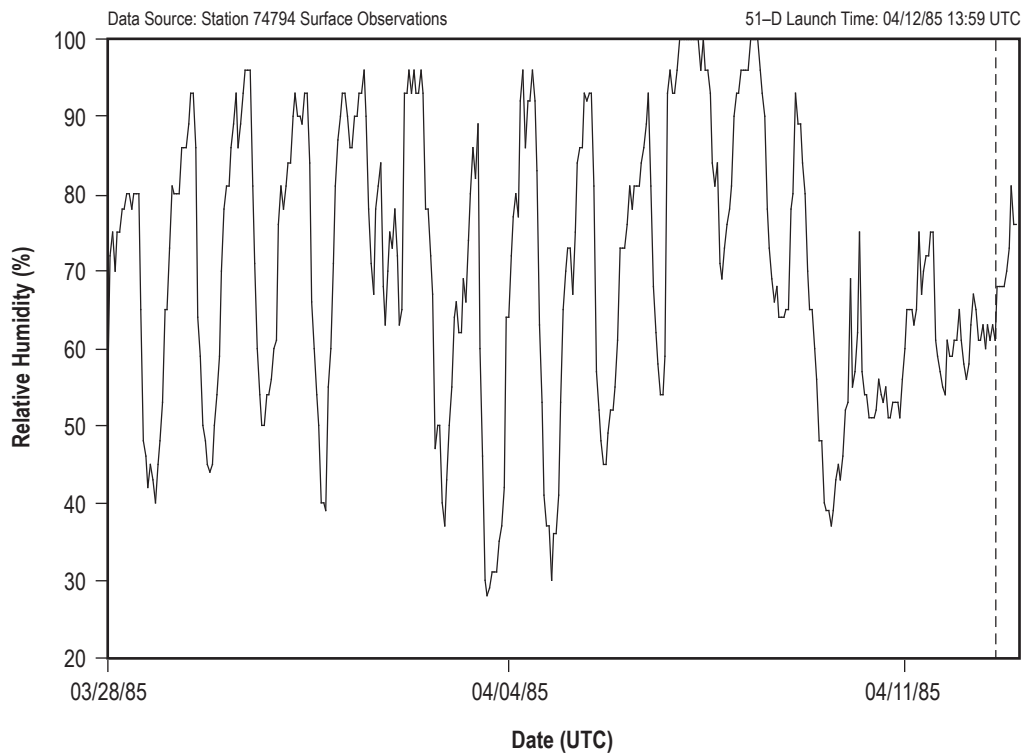


Figure 98. 51-D hourly surface relative humidity.

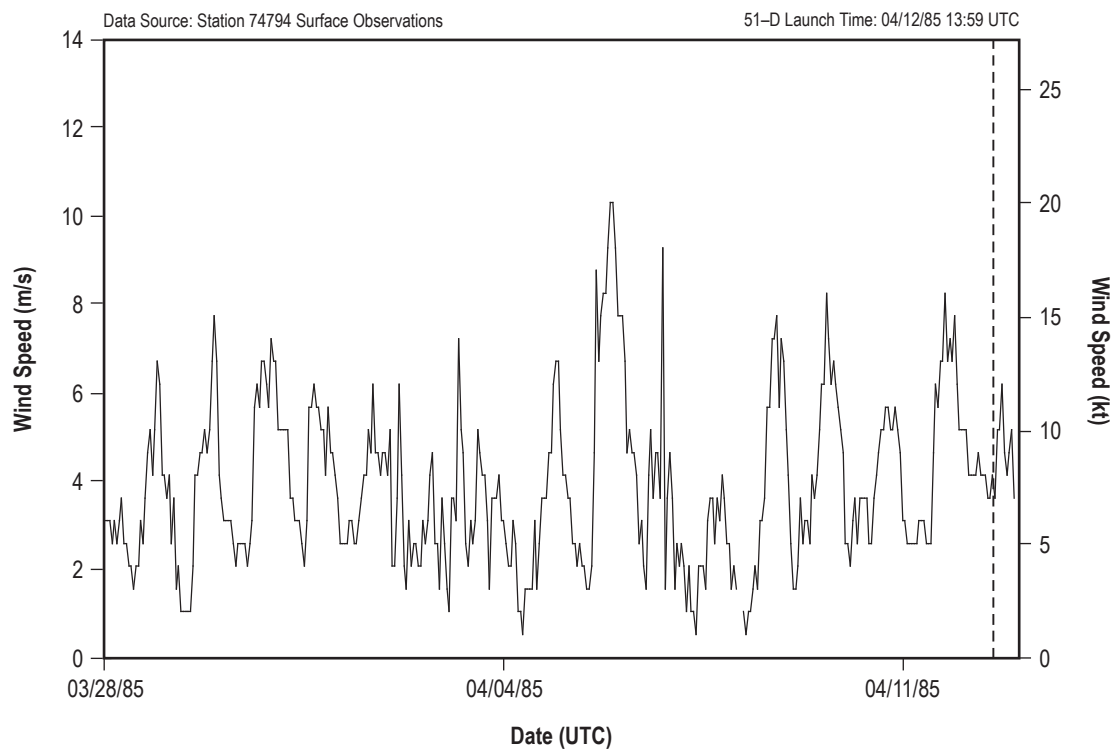


Figure 99. 51-D hourly surface wind speed.

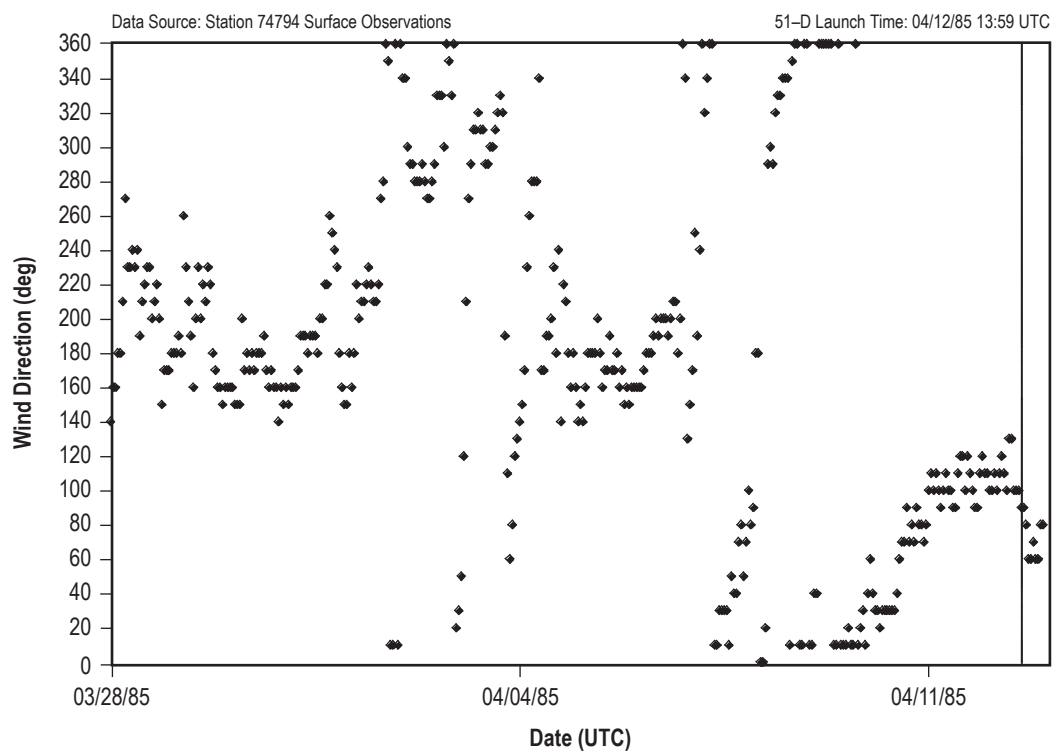


Figure 100. 51-D hourly surface wind direction.



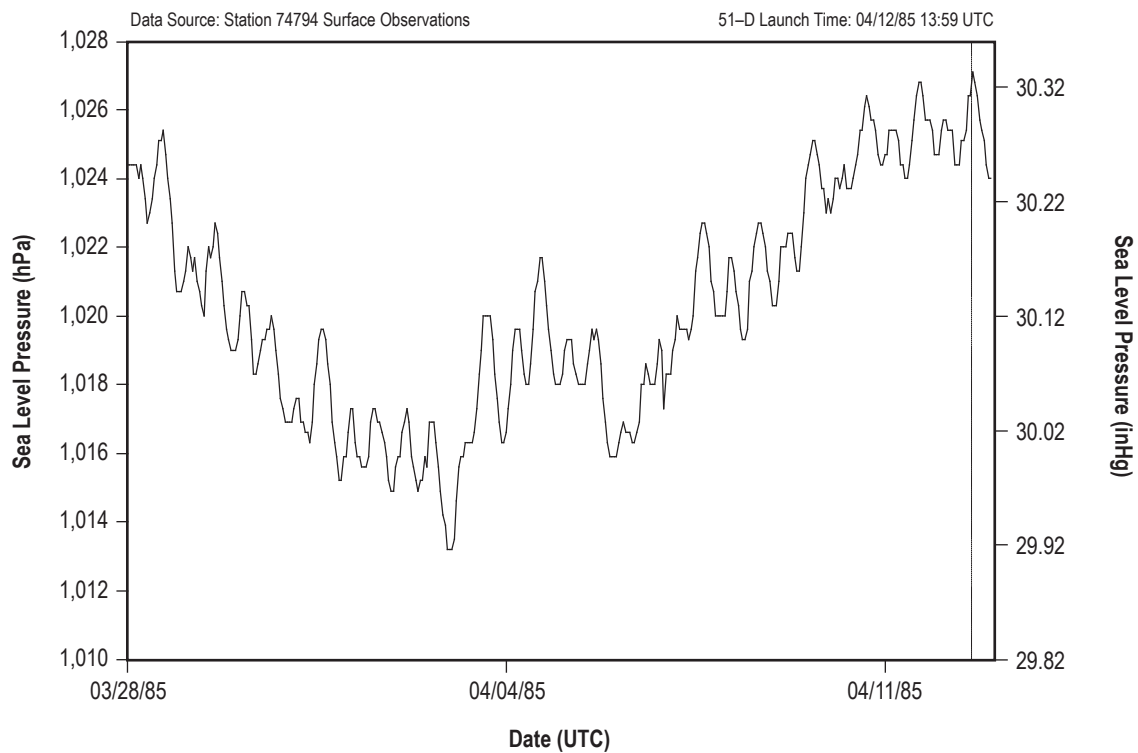


Figure 101. 51-D hourly sea level pressure.

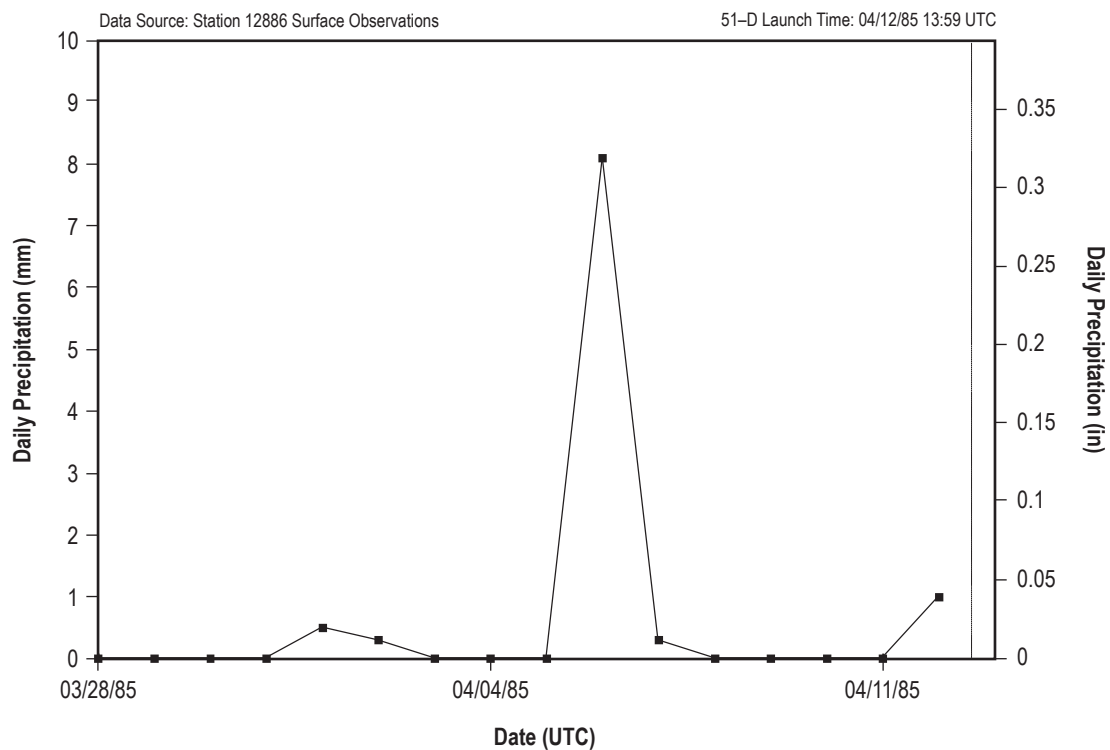


Figure 102. 51-D daily precipitation totals.

## 5.17 51-B

51-B was the seventh mission for *Challenger* (OV-099). It rolled out to pad 39A the first time on February 15, 1985. It was rolled back from the pad on March 4, 1985. 51-B rolled out to pad 39A the second time on April 15, 1985. 51-B was exposed on the pad for a total of 33 days (18 days after the first rollout and 15 days after the second rollout) and launched on April 29, 1985, at 16:02 UTC.

### 5.17.1 51-B Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-B.

### 5.17.2 51-B L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-B are shown in table 37. Temperature and relative humidity were obtained from pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 37.

Table 37. 51-B L-0 surface observations.

Temperature	27.4 °C (81.3 °F)
Relative humidity	65%
Sea level pressure	1,013.5 hPa (29.93 inHg)
Wind speed	3.5 m/s (6.8 kt) (1-min average)
Wind direction	5° (1-min average)
Sky condition	2/8 cumulus at 610 m (2,000 ft); 4/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	10.9 km (5.9 nmi)

### 5.17.3 51-B Pad Exposure Period Surface Meteorological Parameters

Figures 103–108 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-B pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 38. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 38. 51-B pad exposure period hourly extremes.

Minimum temperature	0.6 °C (33 °F)
Maximum temperature	32.8 °C (91 °F)
Minimum relative humidity	29%
Maximum relative humidity	100%
Minimum sea level pressure	1,011.5 hPa (29.87 inHg)
Maximum sea level pressure	1,029.5 hPa (30.40 inHg)
Maximum wind speed and associated wind direction	7.2 m/s (14 kt) 360°
Total precipitation	3 mm (0.12 in)

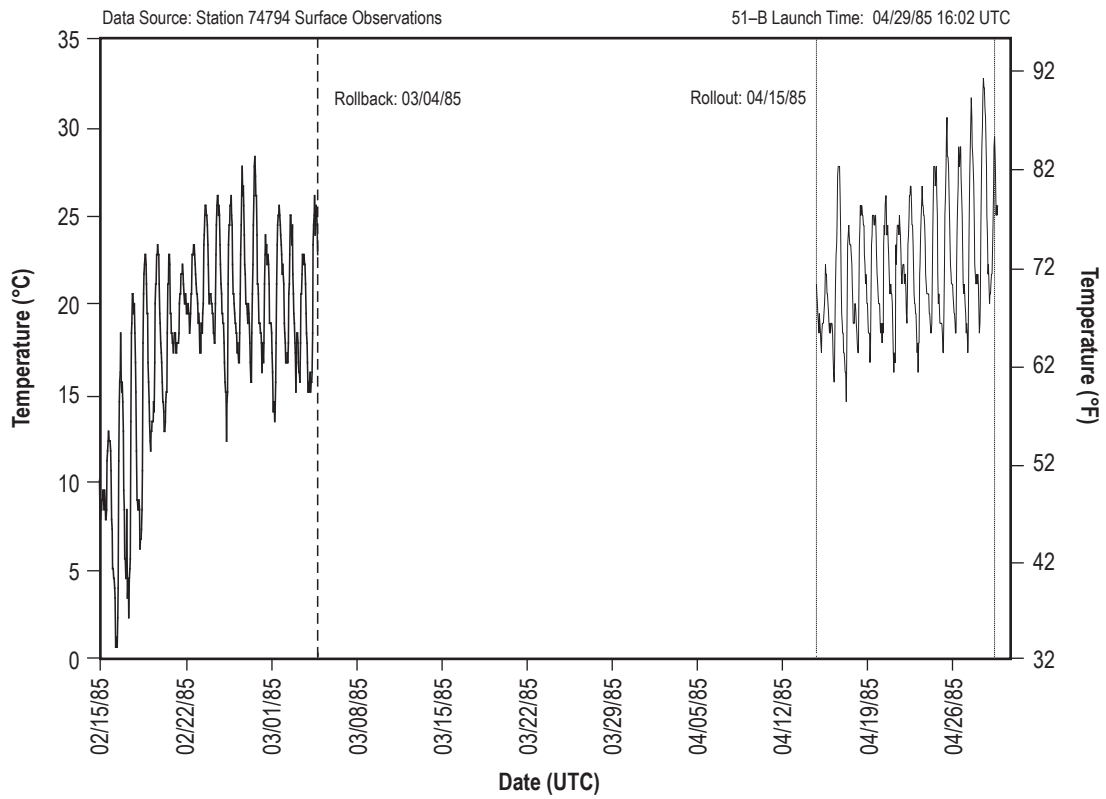


Figure 103. 51-B hourly surface temperature.

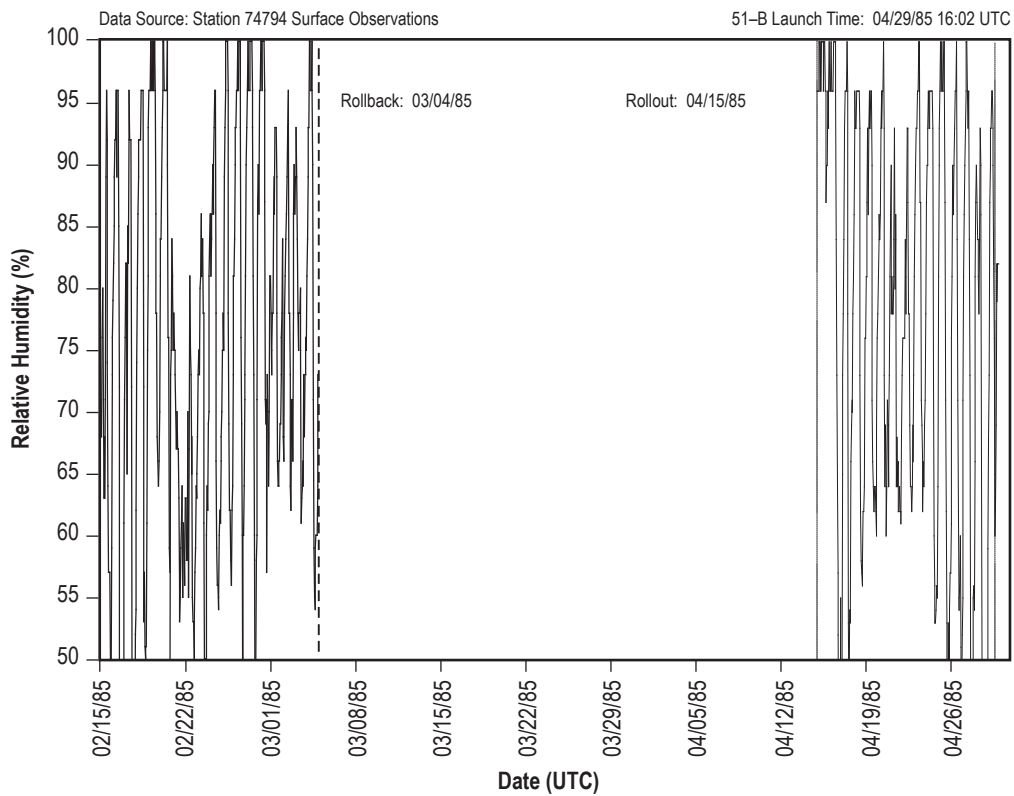


Figure 104. 51-B hourly surface relative humidity.

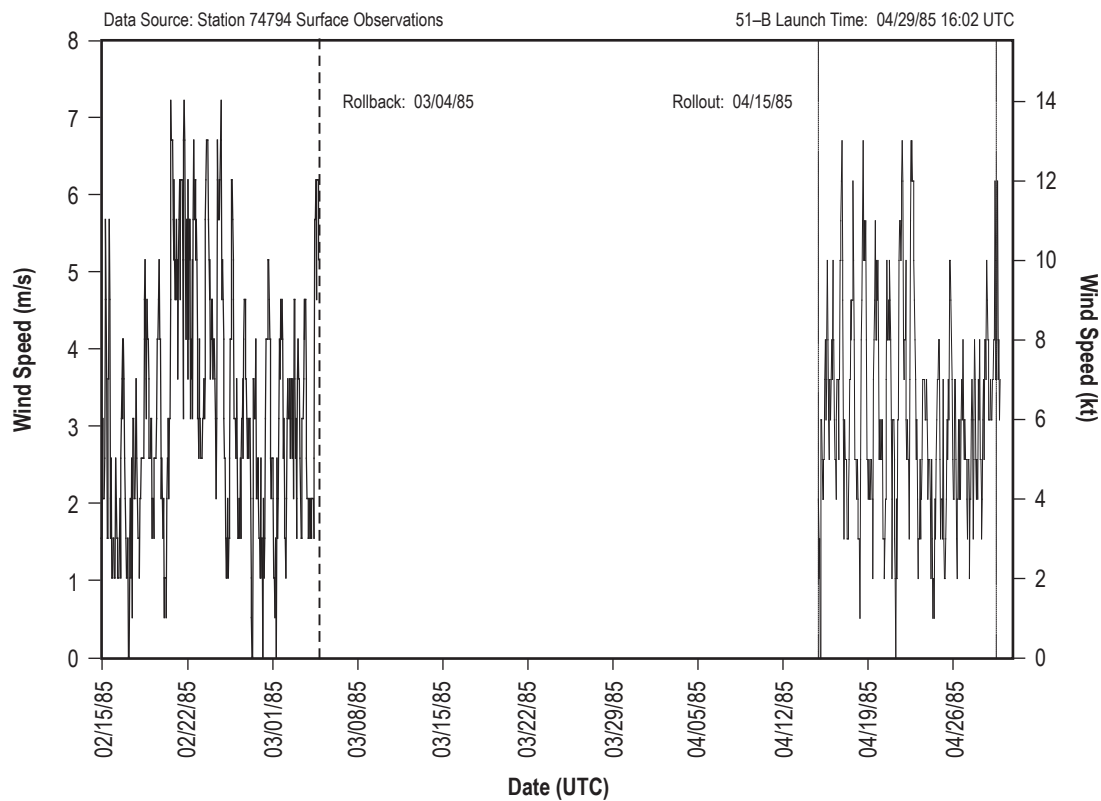


Figure 105. 51-B hourly surface wind speed.

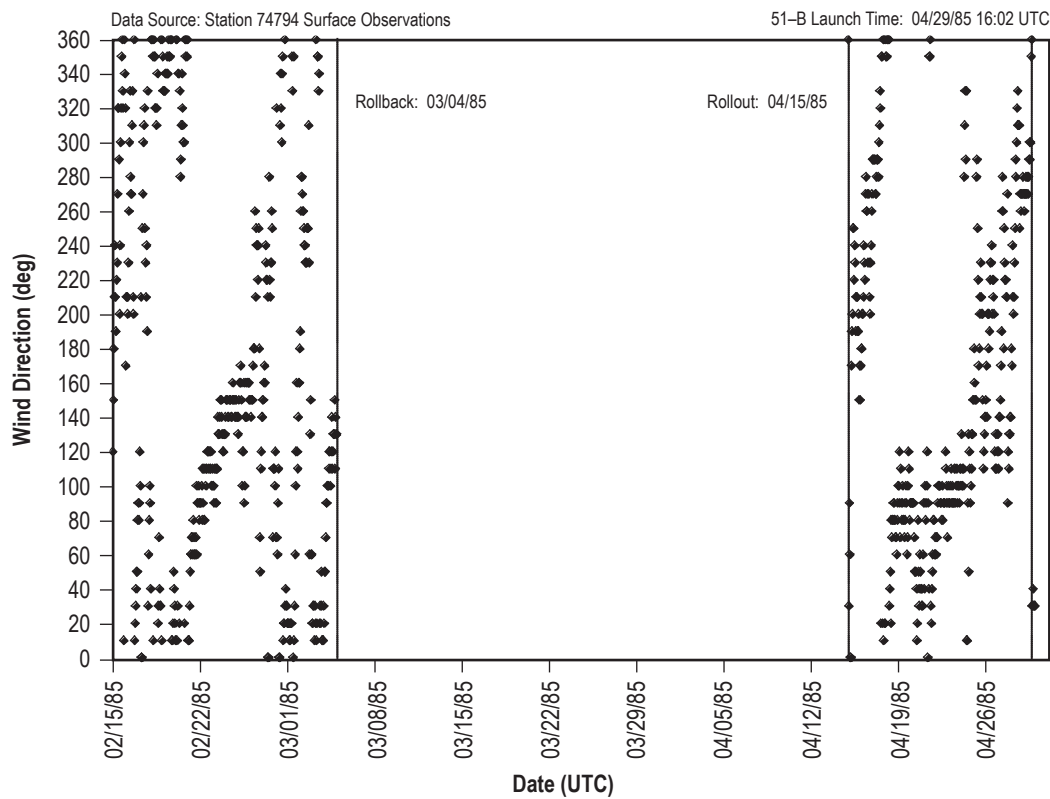


Figure 106. 51-B hourly surface wind direction.

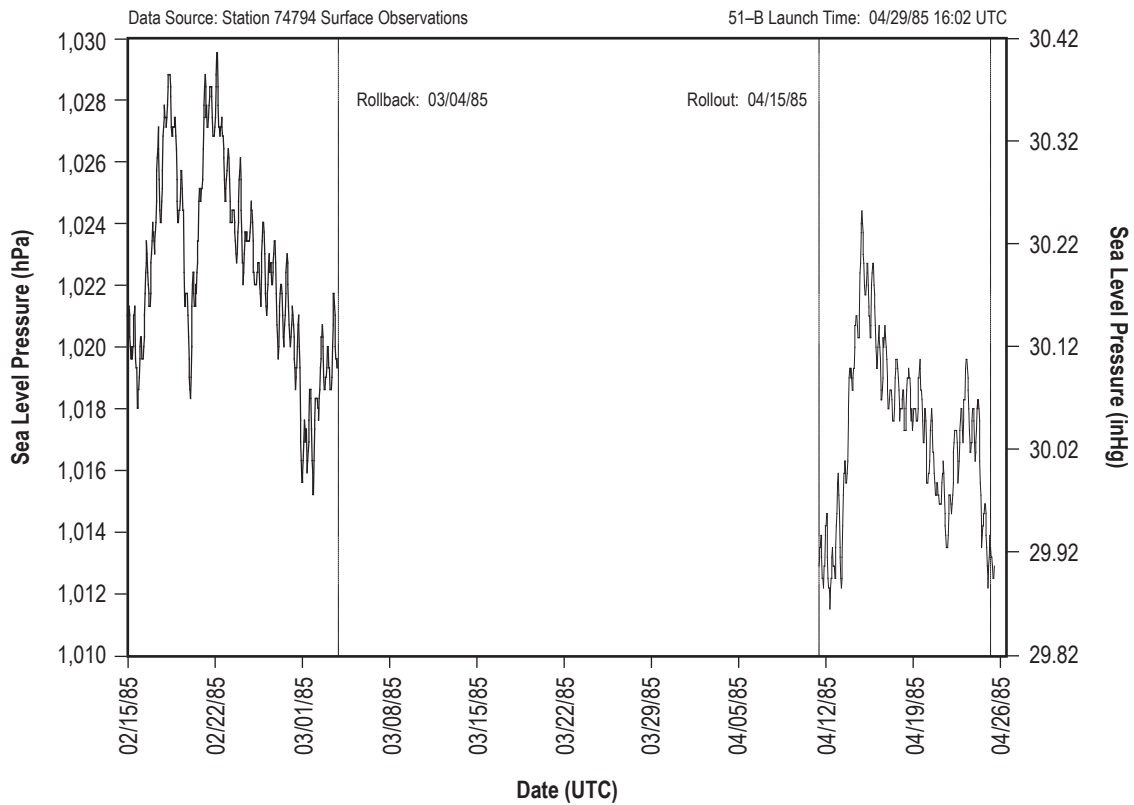


Figure 107. 51-B hourly sea level pressure.

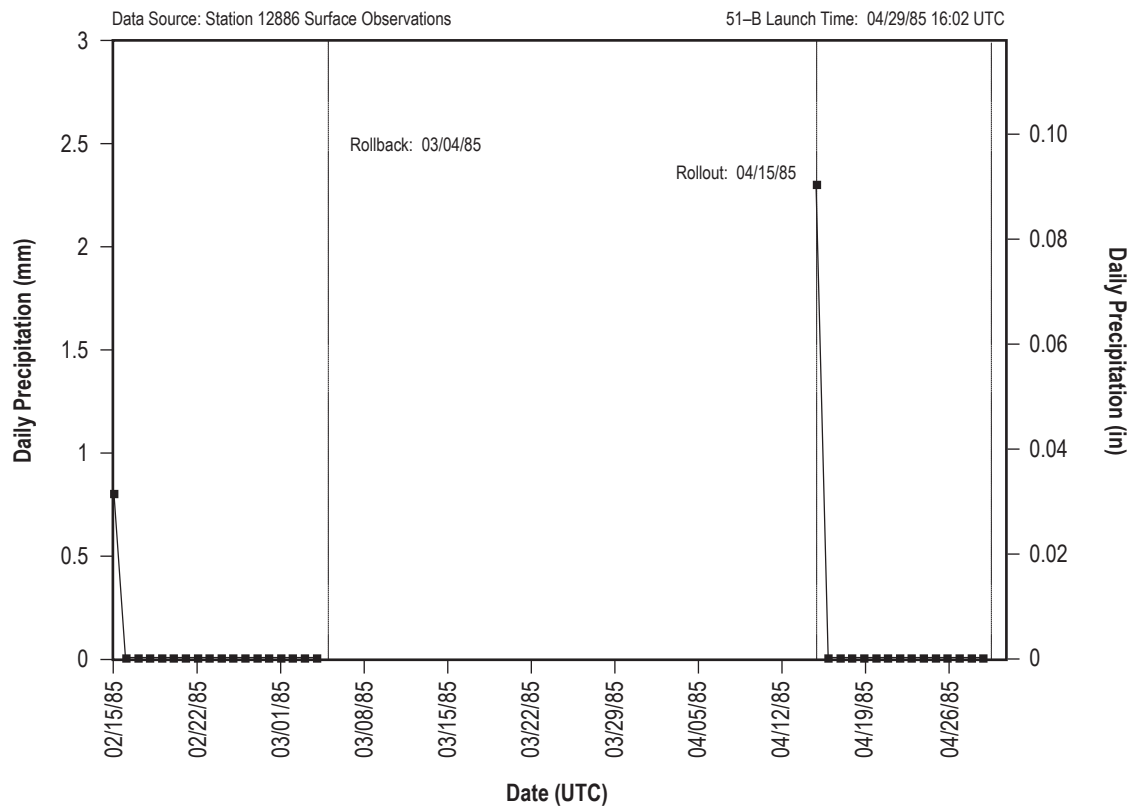


Figure 108. 51-B daily precipitation totals.

## 5.18 51-G

51-G was the fifth mission for *Discovery* (OV-103). It rolled out to pad 39A on June 4, 1985. 51-G was exposed on the pad for 14 days and launched on June 17, 1985, at 11:33 UTC.

### 5.18.1 51-G Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-G.

### 5.18.2 51-G L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-G are shown in table 39. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 39.

Table 39. 51-G L-0 surface observations.

Temperature	22.8 °C (73 °F)
Relative humidity	91%
Sea level pressure	1,020.7 hPa (30.14 inHg)
Wind speed	0.9 m/s (1.7 kt) (1-min average)
Wind direction	201° (1-min average)
Sky condition	6/8 cirrus at 7,620 m (25,000 ft)
Visibility	14.5 km (7.8 nmi)

### 5.18.3 51-G Pad Exposure Period Surface Meteorological Parameters

Figures 109–114 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-G pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 40. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 40. 51-G pad exposure period hourly extremes.

Minimum temperature	20 °C (68 °F)
Maximum temperature	35.6 °C (96 °F)
Minimum relative humidity	32%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.2 hPa (29.89 inHg)
Maximum sea level pressure	1,021.7 hPa (30.17 inHg)
Maximum wind speed and associated wind direction	10.3 m/s (20 kt) 220°
Total precipitation	77 mm (3.03 in)

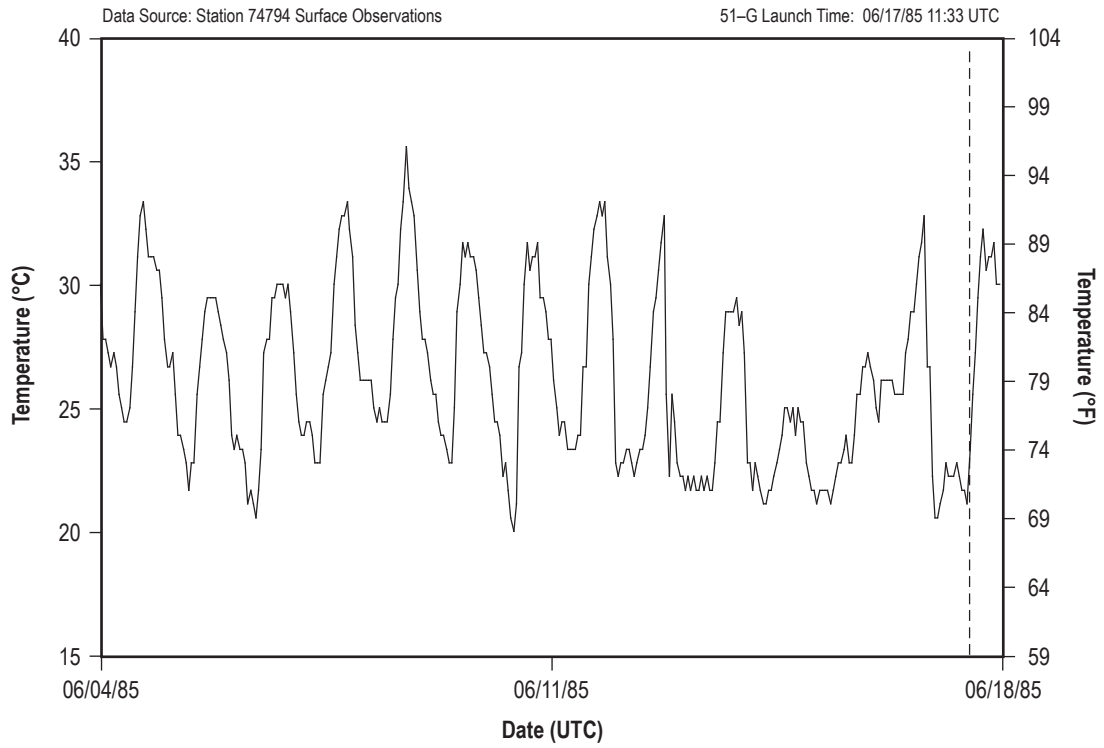


Figure 109. 51-G hourly surface temperature.

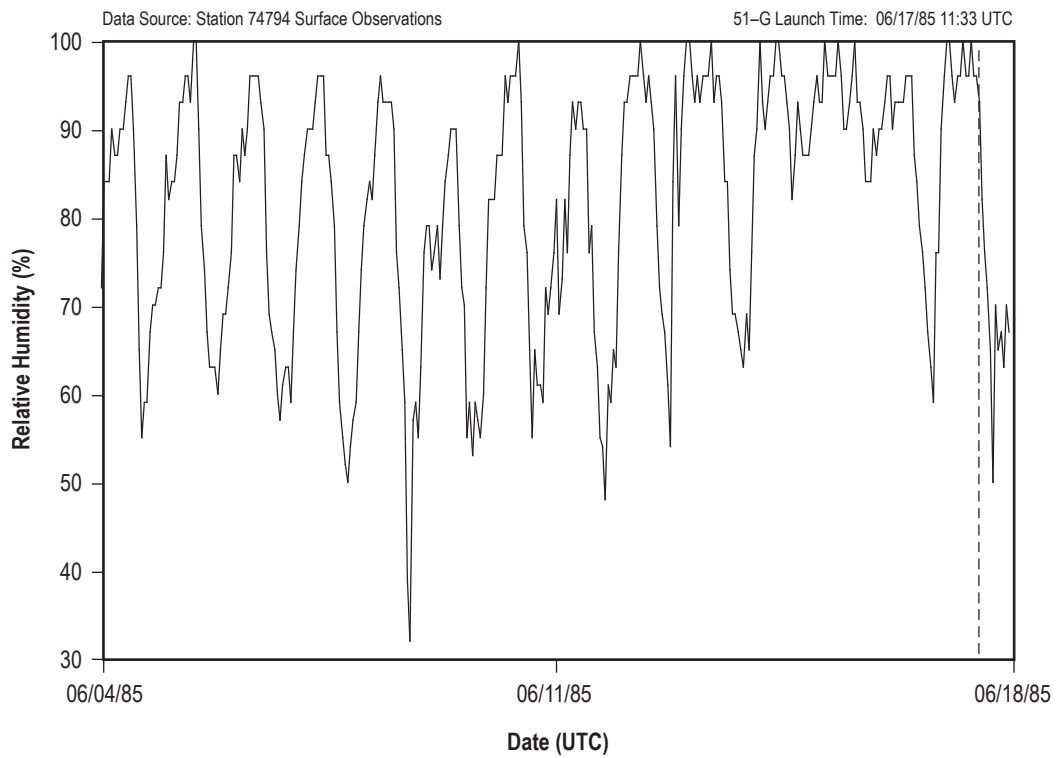


Figure 110. 51-G hourly surface relative humidity.

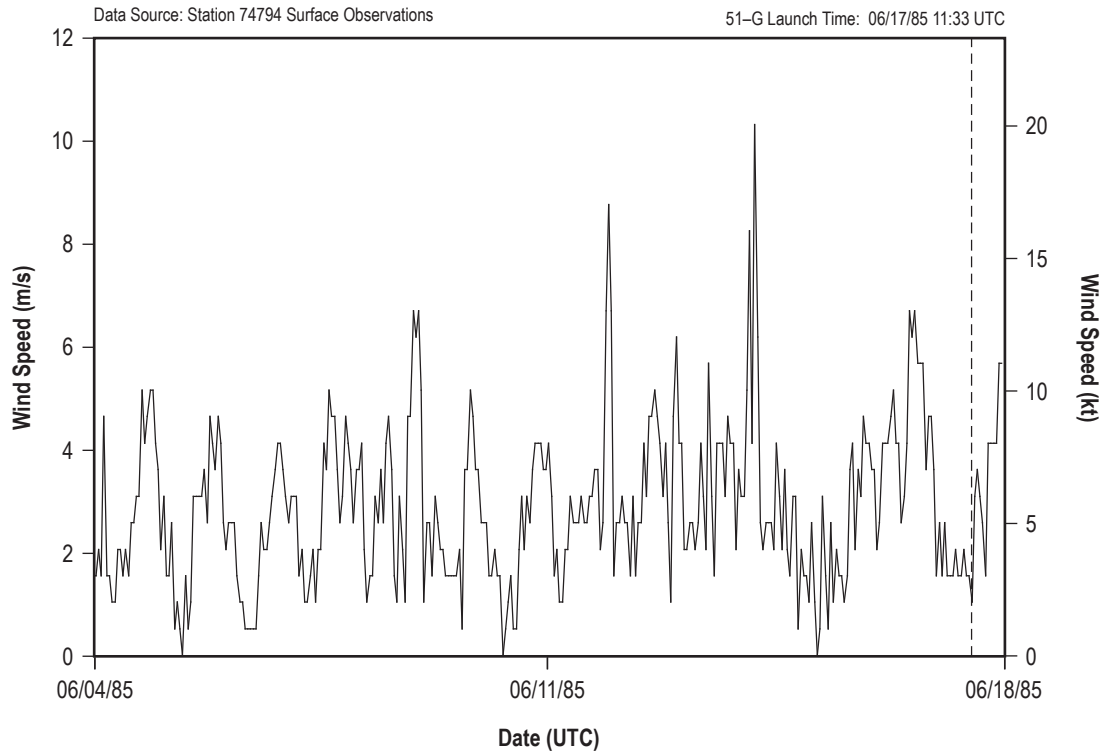


Figure 111. 51-G hourly surface wind speed.

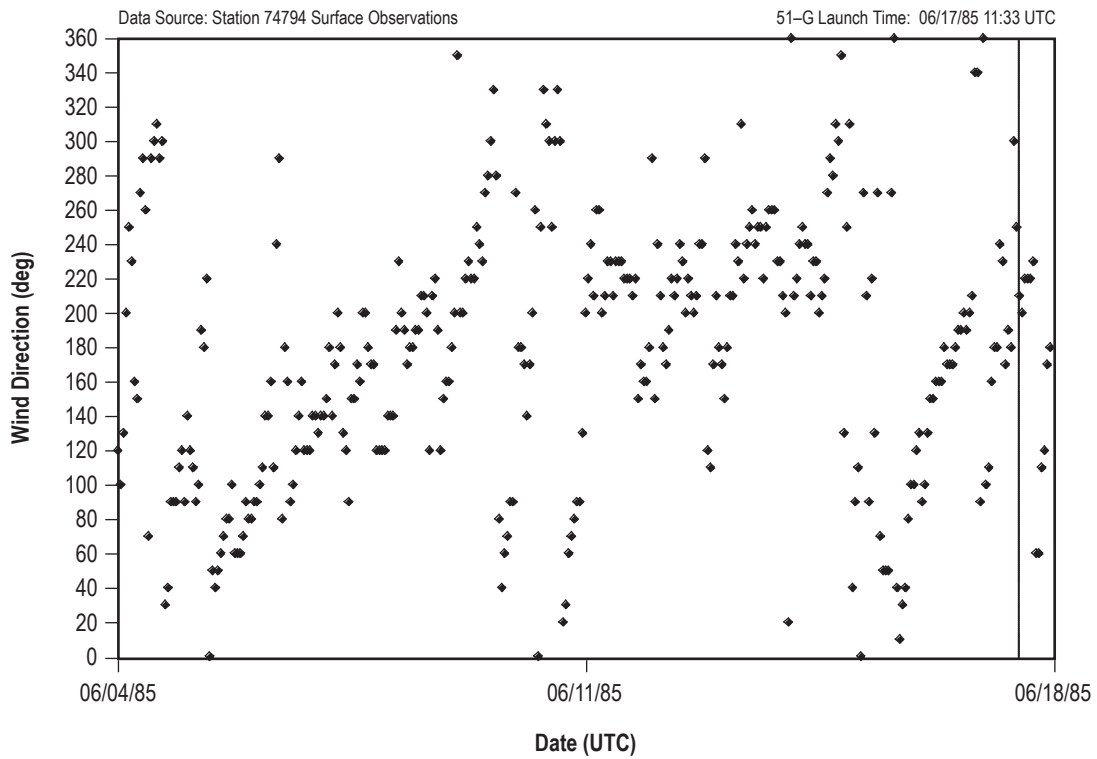


Figure 112. 51-G hourly surface wind direction.



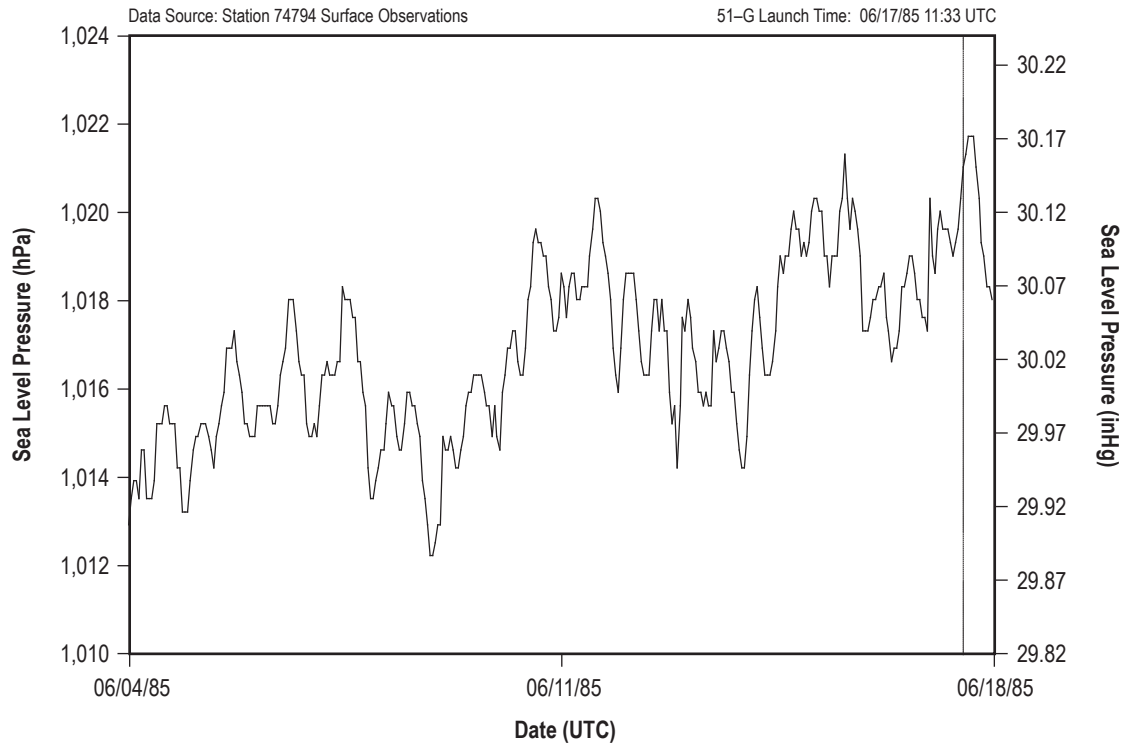


Figure 113. 51-G hourly sea level pressure.

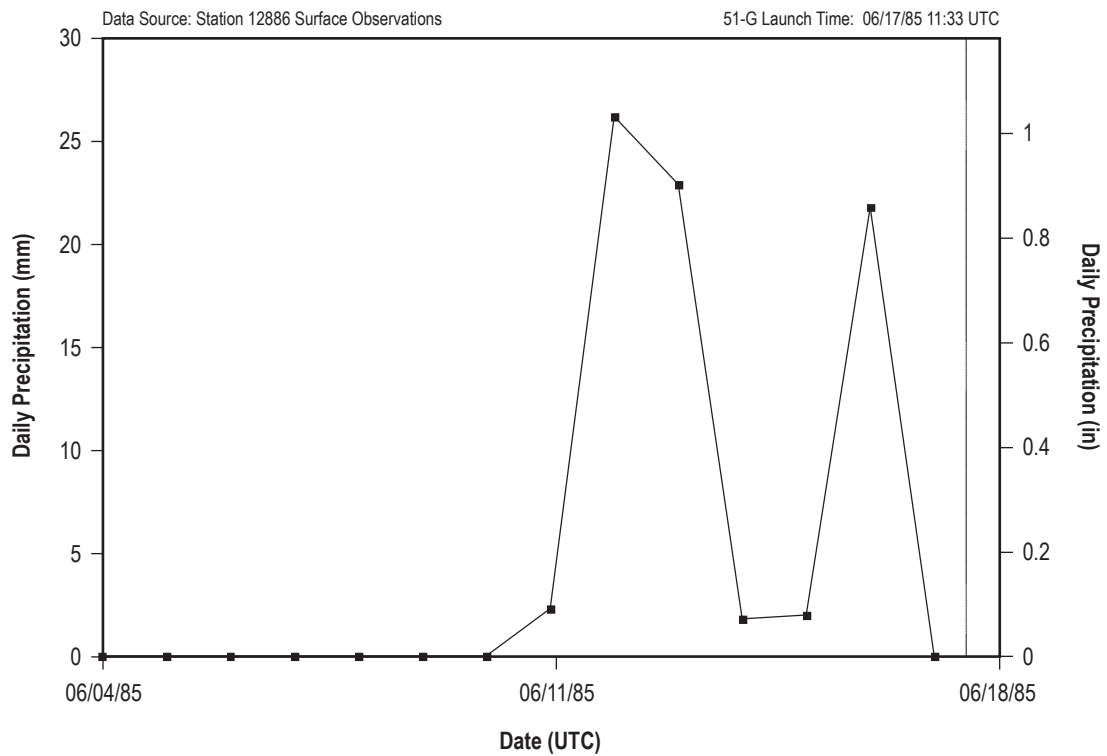


Figure 114. 51-G daily precipitation totals.

## 5.19 51-F

51-F was the eighth mission for *Challenger* (OV-099). It rolled out to pad 39A on June 29, 1985. 51-F was exposed on the pad for 31 days and launched on July 29, 1985, at 21:00 UTC.

### 5.19.1 51-F Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-F.

### 5.19.2 51-F L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-F are shown in table 41. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 41.

Table 41. 51-F L-0 surface observations.

Temperature	28.3 °C (82.8 °F)
Relative humidity	72%
Sea level pressure	1,018 hPa (30.06 inHg)
Wind speed	4.5 m/s (8.8 kt) (1-min average)
Wind direction	101° (1-min average)
Sky condition	4/8 cumulonimbus at 823 m (2,700 ft); 8/8 cirrostratus at 7,925 m (26,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.19.3 51-F Pad Exposure Period Surface Meteorological Parameters

Figures 115–120 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-F pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 42. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 42. 51-F pad exposure period hourly extremes.

Minimum temperature	19.4 °C (67 °F)
Maximum temperature	34.4 °C (94 °F)
Minimum relative humidity	44%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,023 hPa (30.21 inHg)
Maximum wind speed and associated wind direction	10.8 m/s (21 kt) 180°
Total precipitation	133.1 mm (5.24 in)

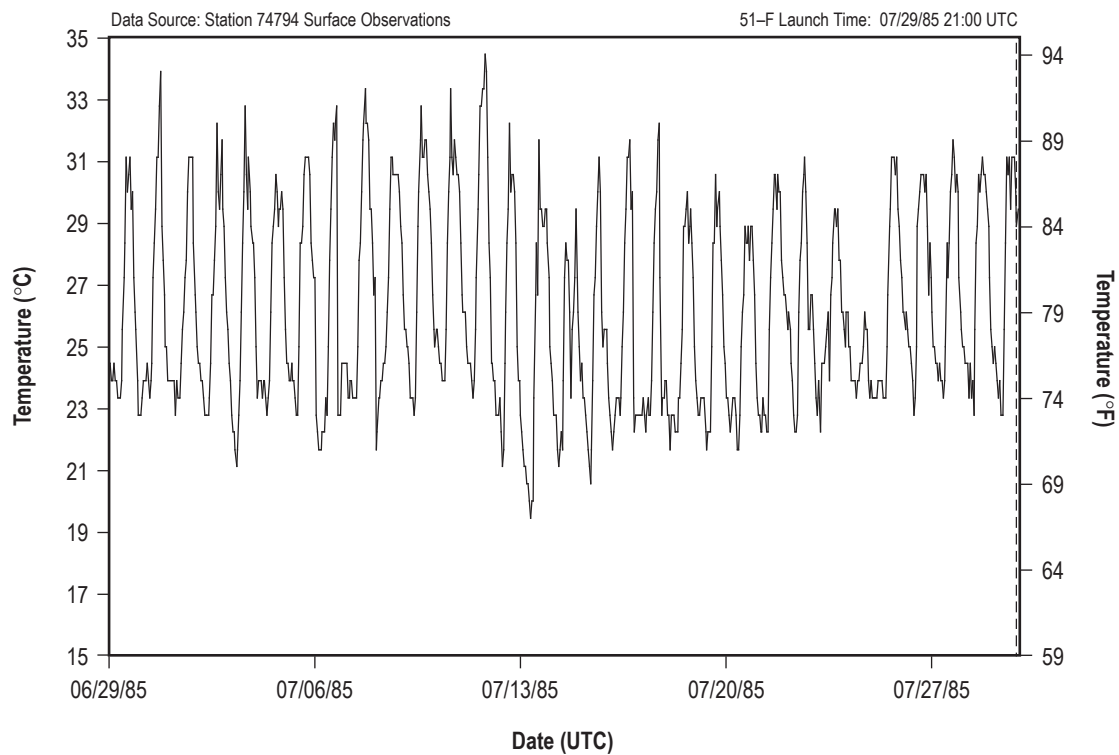


Figure 115. 51-F hourly surface temperature.

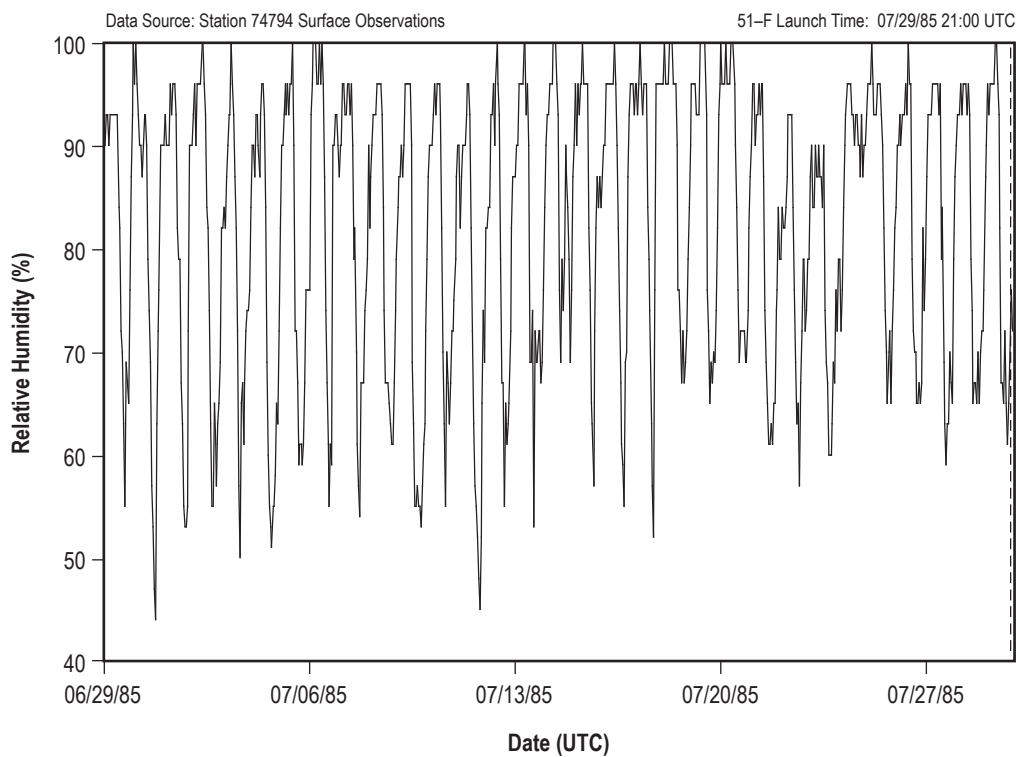


Figure 116. 51-F hourly surface relative humidity.

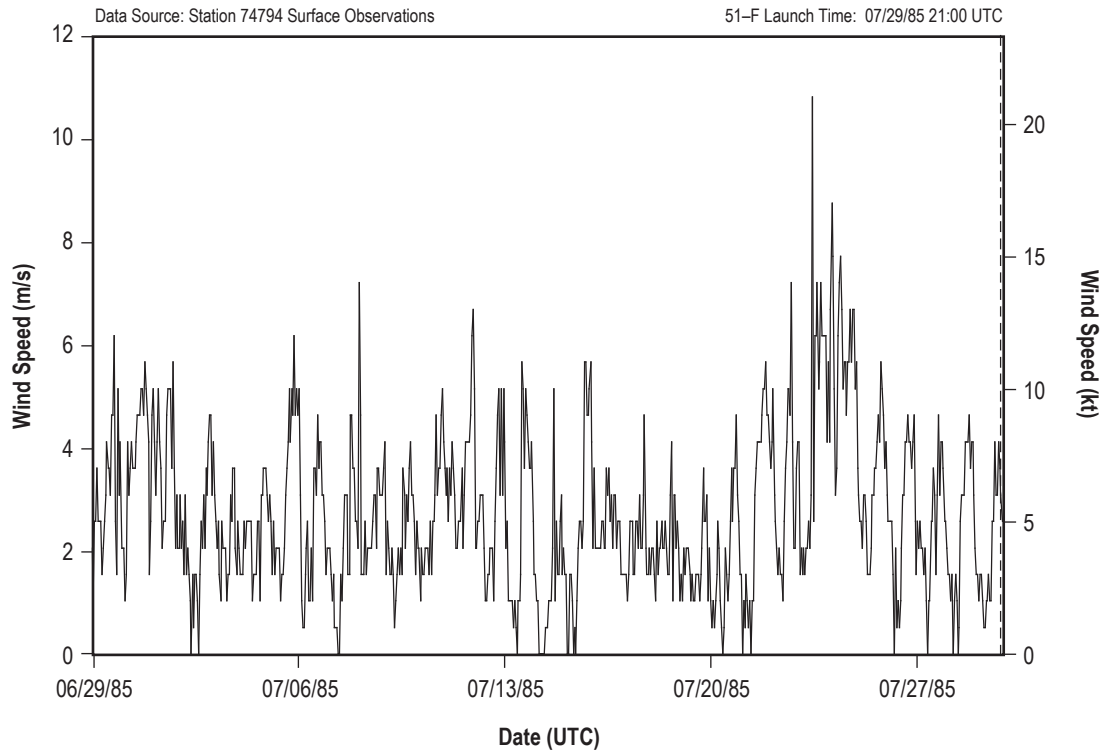


Figure 117. 51-F hourly surface wind speed.

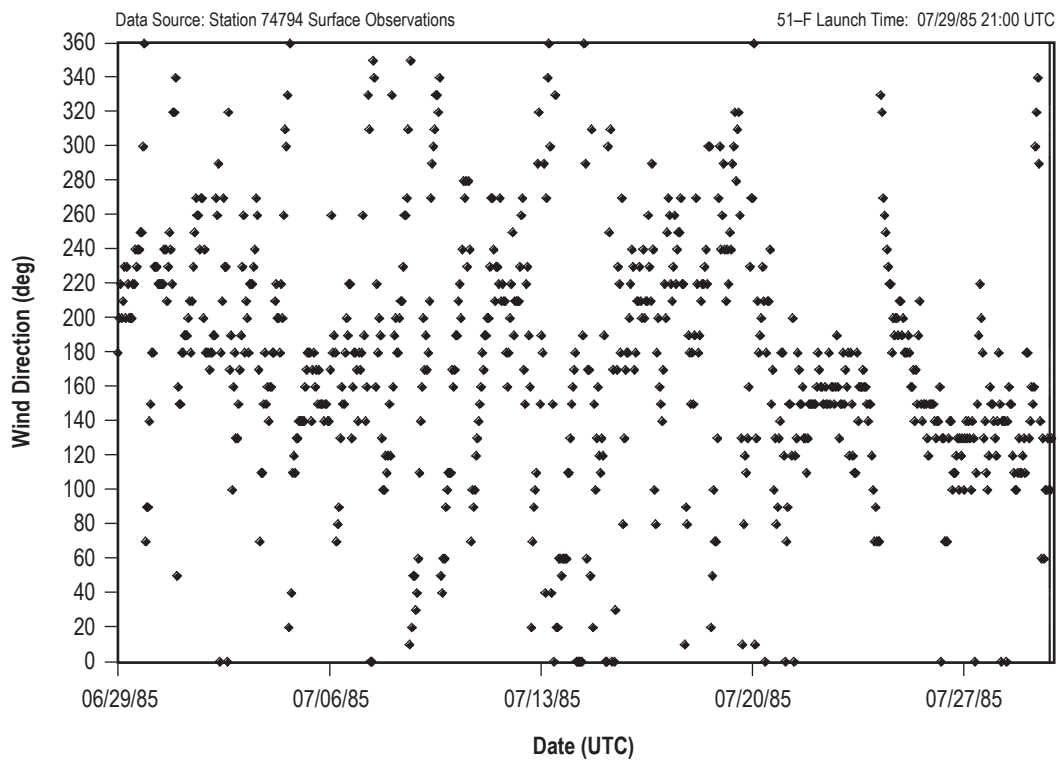


Figure 118. 51-F hourly surface wind direction.

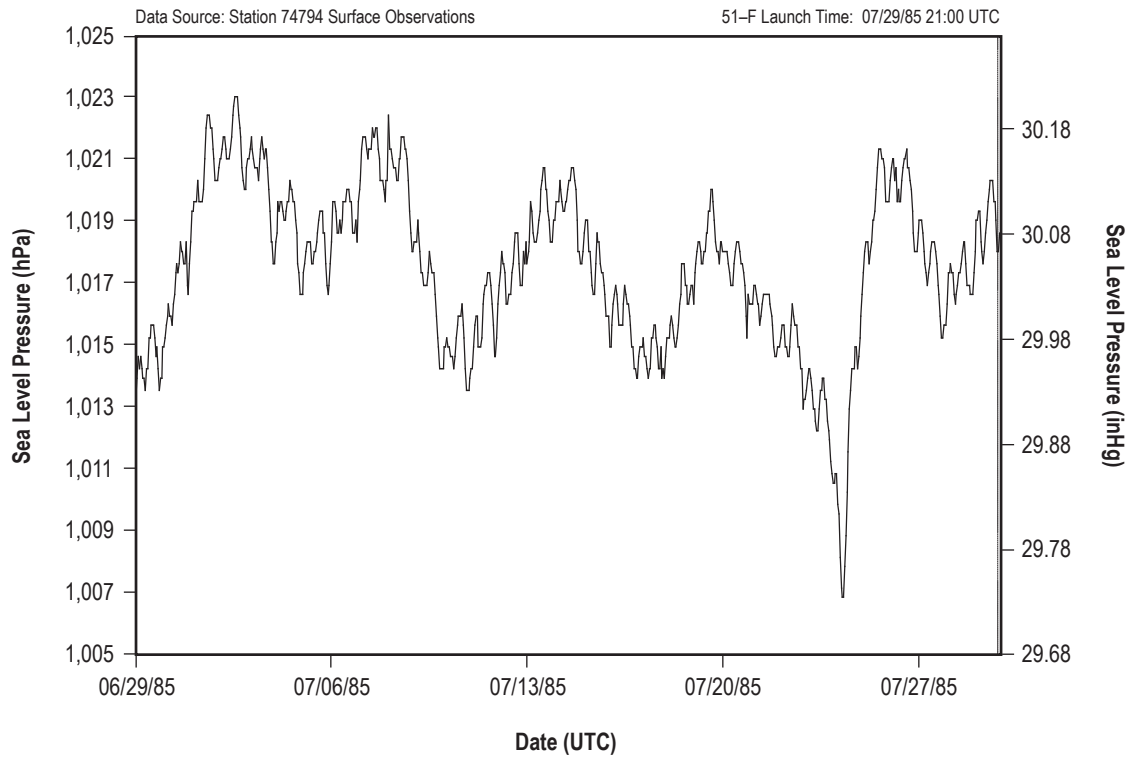


Figure 119. 51-F hourly sea level pressure.

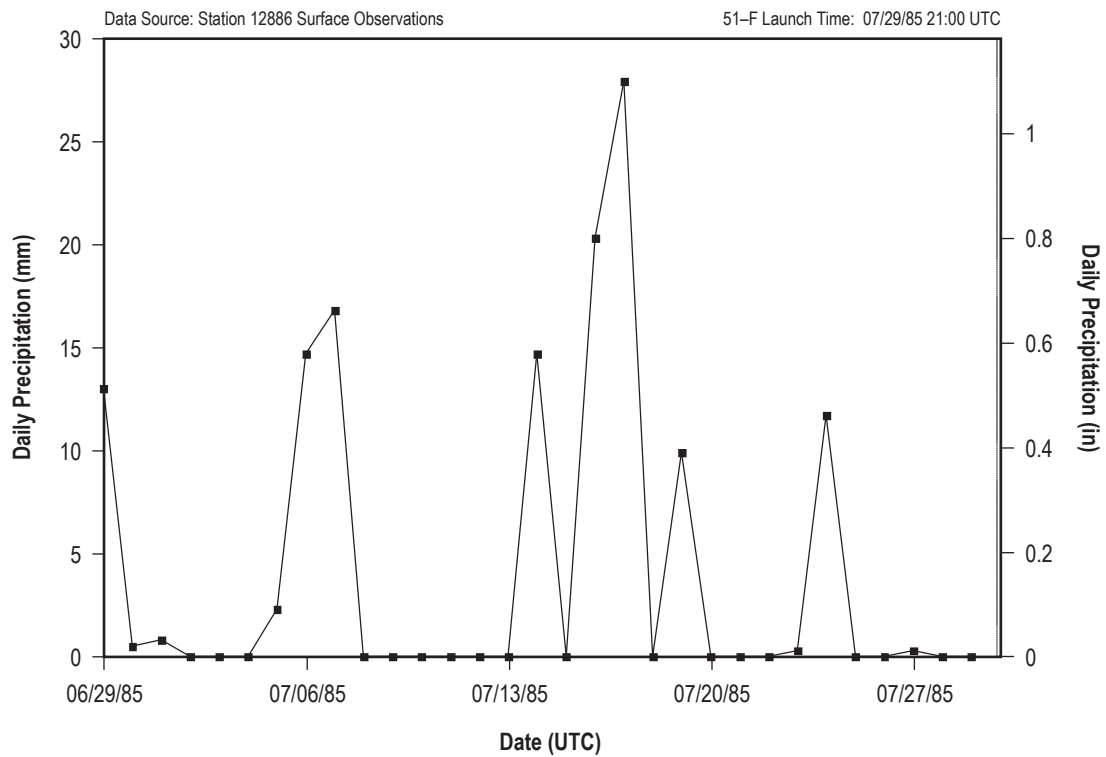


Figure 120. 51-F daily precipitation totals.

## 5.20 51-I

51-I was the sixth mission for *Discovery* (OV-103). It rolled out to pad 39A on August 6, 1985. 51-I was exposed on the pad for 22 days and launched on August 27, 1985, at 10:58 UTC.

### 5.20.1 51-I Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-I.

### 5.20.2 51-I L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-I are shown in table 43. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 43.

Table 43. 51-I L-0 surface observations.

Temperature	24.3 °C (75.7 °F)
Relative humidity	86%
Sea level pressure	1,023 hPa (30.21 inHg)
Wind speed	4.3 m/s (8.4 kt) (1-min average)
Wind direction	73° (1-min average)
Sky condition	2/8 cumulus at 488 m (1,600 ft); 1/8 stratocumulus at 1,219 m (4,000 ft); 4/8 altocumulus at 3,962 m (13,000 ft); 3/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.20.3 51-I Pad Exposure Period Surface Meteorological Parameters

Figures 121–126 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-I pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 44. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 44. 51-I pad exposure period hourly extremes.

Minimum temperature	22.2 °C (72 °F)
Maximum temperature	32.8 °C (91 °F)
Minimum relative humidity	50%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.9 hPa (29.91 inHg)
Maximum sea level pressure	1,024 hPa (30.24 inHg)
Maximum wind speed and associated wind direction	7.7 m/s (15 kt) 130°
Total precipitation	189.7 mm (7.47 in)

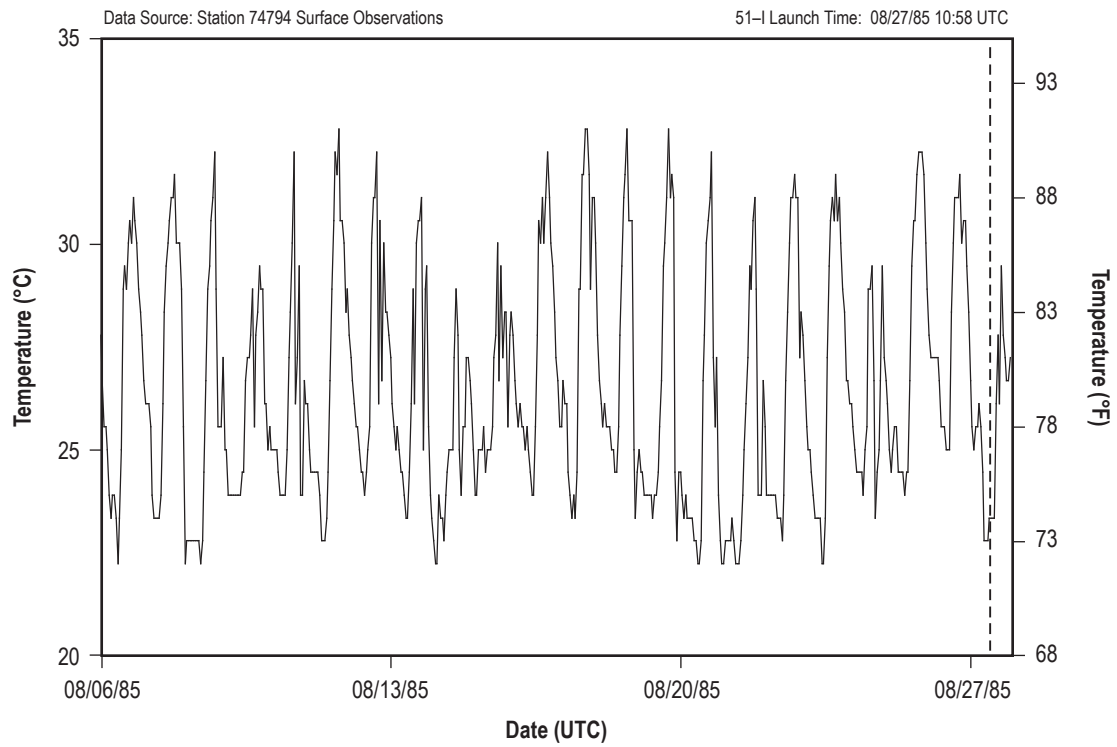


Figure 121. 51-I hourly surface temperature.

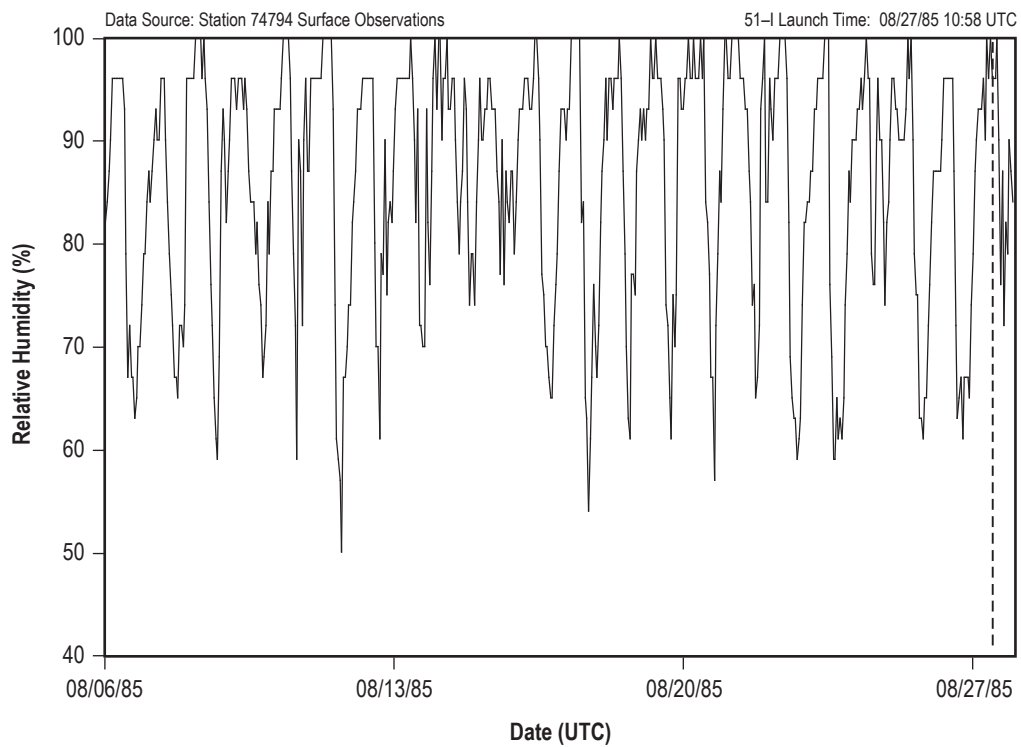


Figure 122. 51-I hourly surface relative humidity.

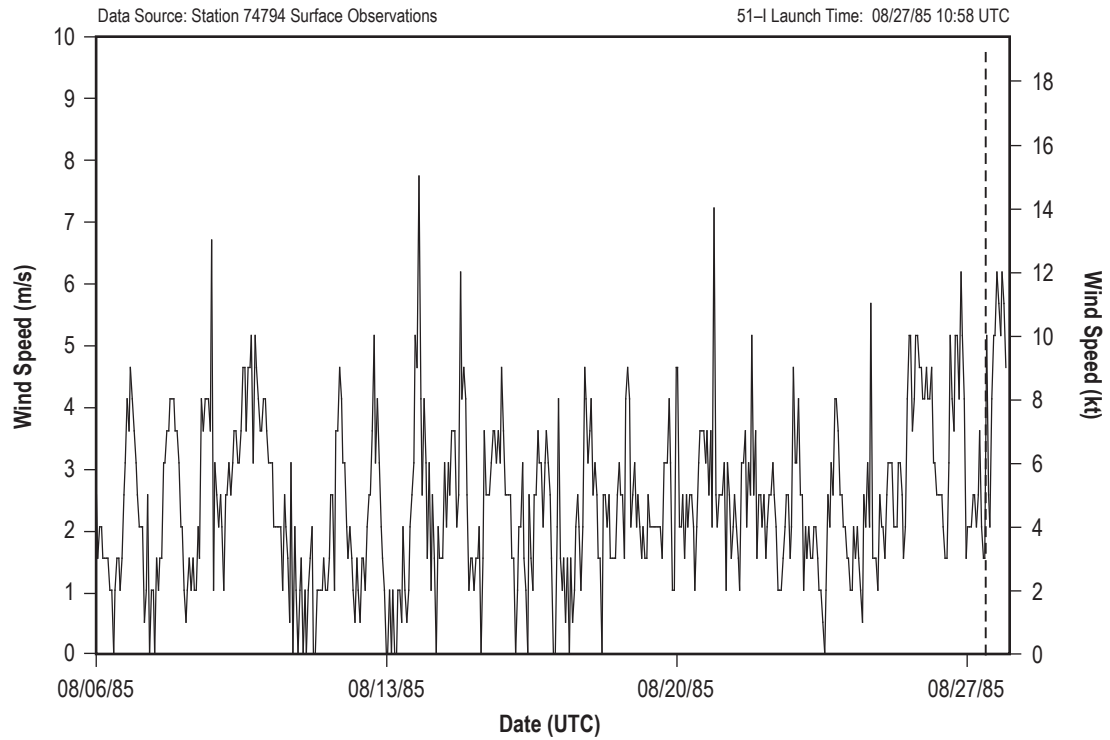


Figure 123. 51-I hourly surface wind speed.

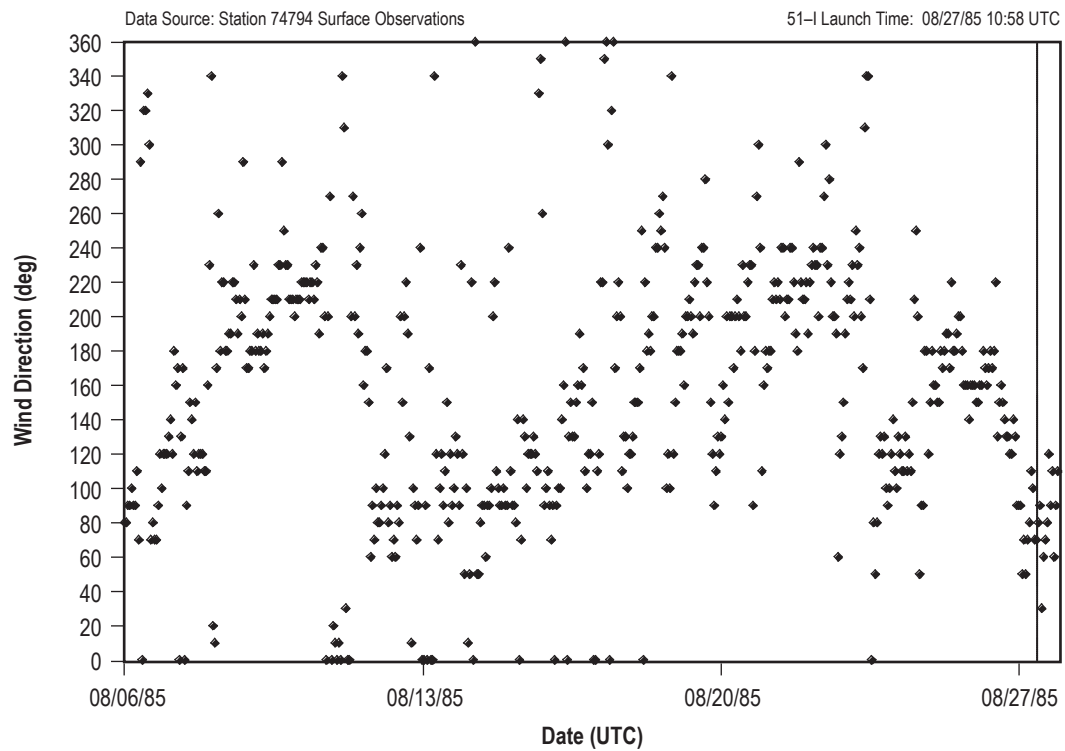


Figure 124. 51-I hourly surface wind direction.



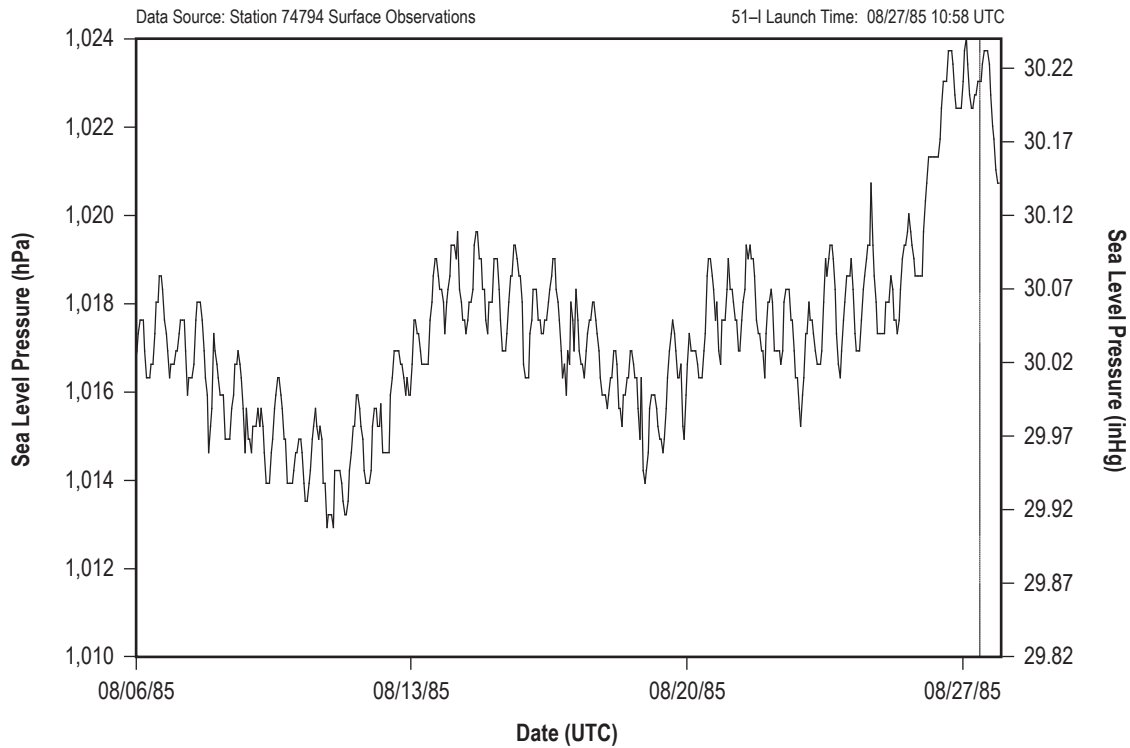


Figure 125. 51-I hourly sea level pressure.

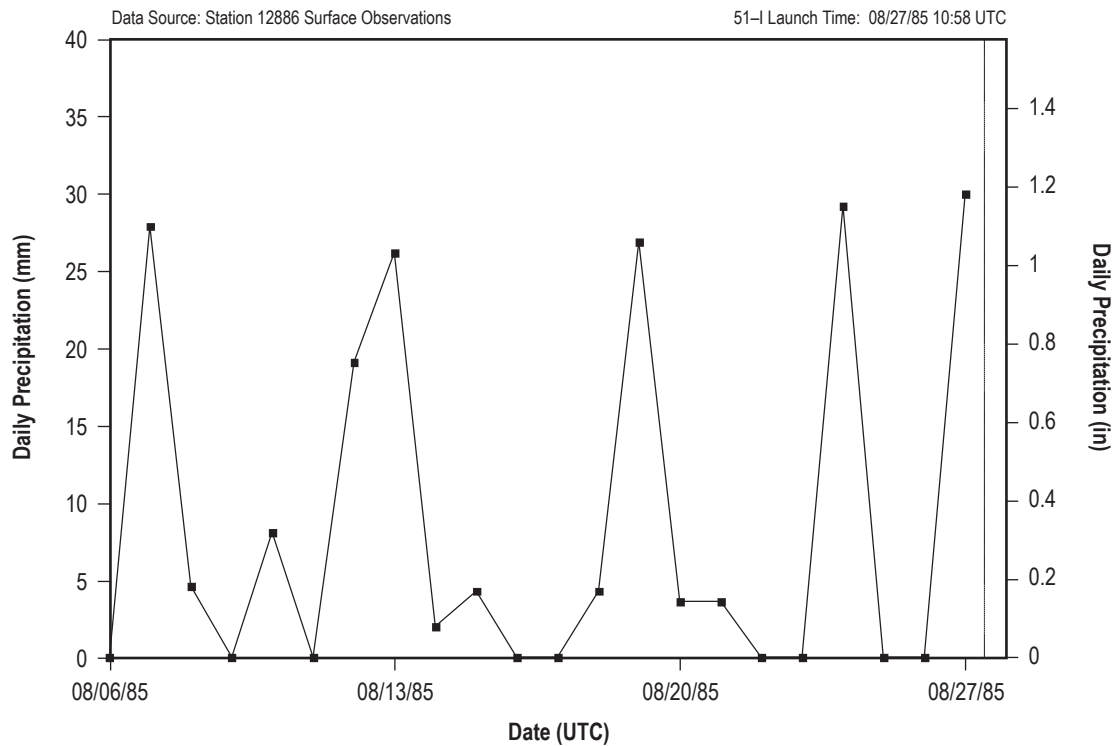


Figure 126. 51-I daily precipitation totals.

## 5.21 51-J

51-J was the first mission for *Atlantis* (OV-104). It rolled out to pad 39A on August 30, 1985. 51-J was exposed on the pad for 35 days and launched on October 3, 1985, at 15:15 UTC.

### 5.21.1 51-J Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-J.

### 5.21.2 51-J L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-J are shown in table 45. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 45.

Table 45. 51-J L-0 surface observations.

Temperature	28.2 °C (82.8 °F)
Relative humidity	79%
Sea level pressure	1,019.3 hPa (30.1 inHg)
Wind speed	5.2 m/s (10 kt) (1-min average)
Wind direction	213° (1-min average)
Sky condition	3/8 cumulus at 518 m (1,700 ft); 1/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.21.3 51-J Pad Exposure Period Surface Meteorological Parameters

Figures 127–132 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-J pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 46. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 46. 51-J pad exposure period hourly extremes.

Minimum temperature	20 °C (68 °F)
Maximum temperature	33.3 °C (92 °F)
Minimum relative humidity	51%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,022 hPa (30.18 inHg)
Maximum wind speed and associated wind direction	12.9 m/s (25 kt) 180°
Total precipitation	252 mm (9.92 in)

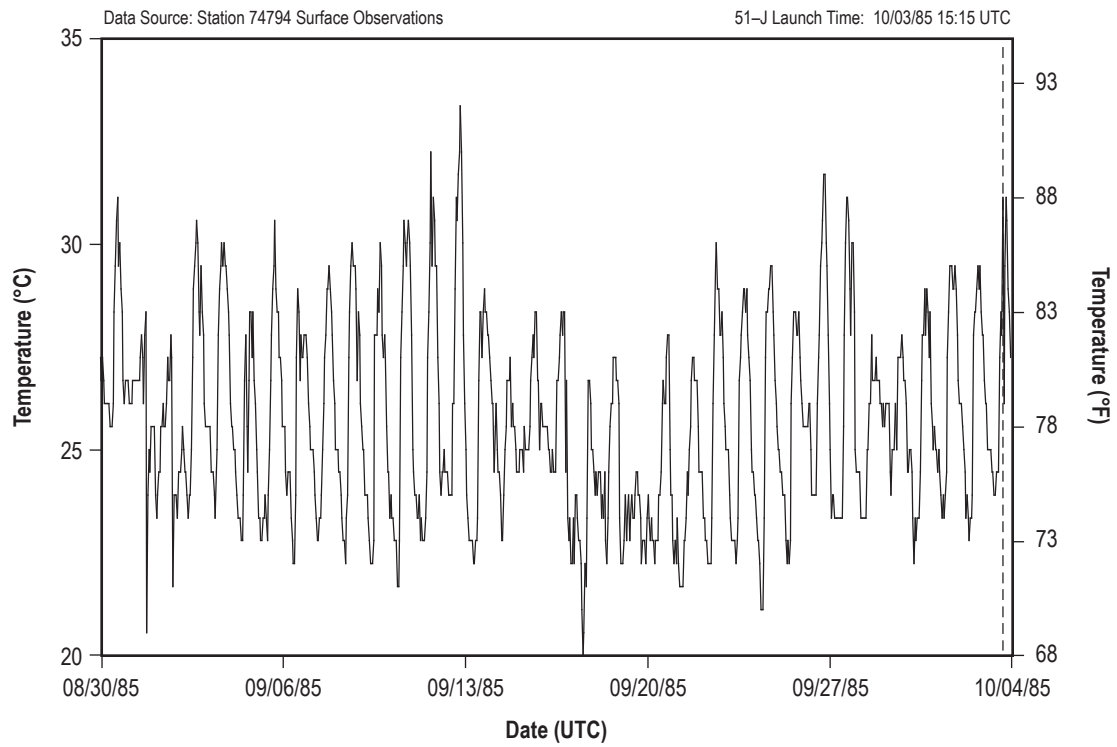


Figure 127. 51-J hourly surface temperature.

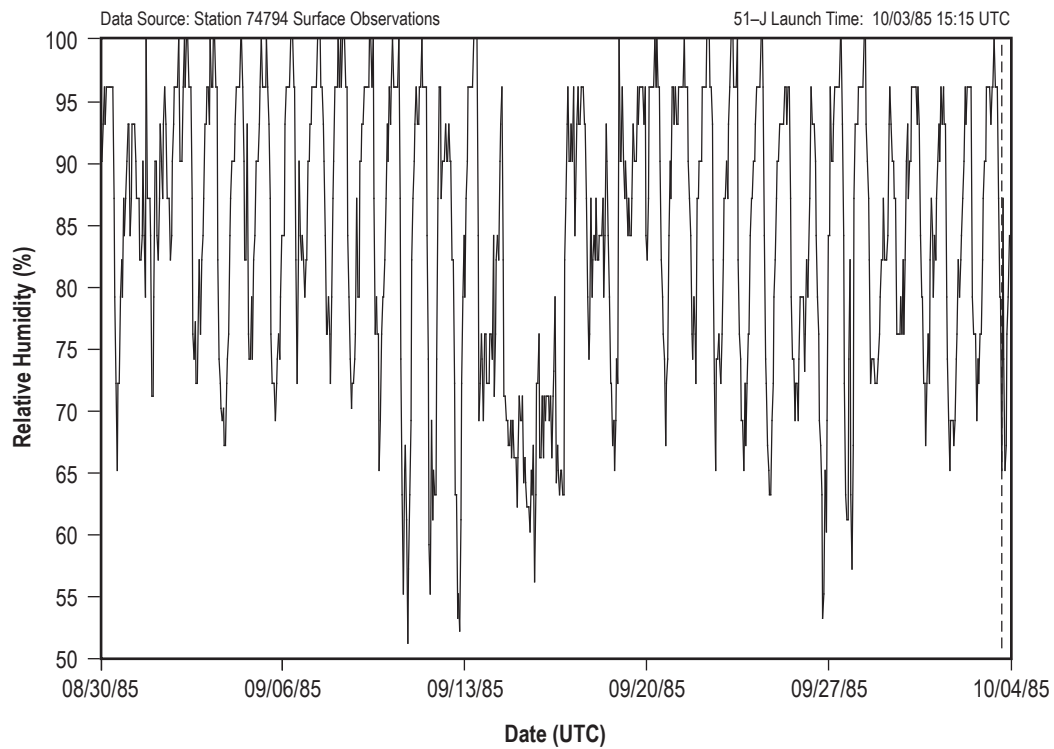


Figure 128. 51-J hourly surface relative humidity.

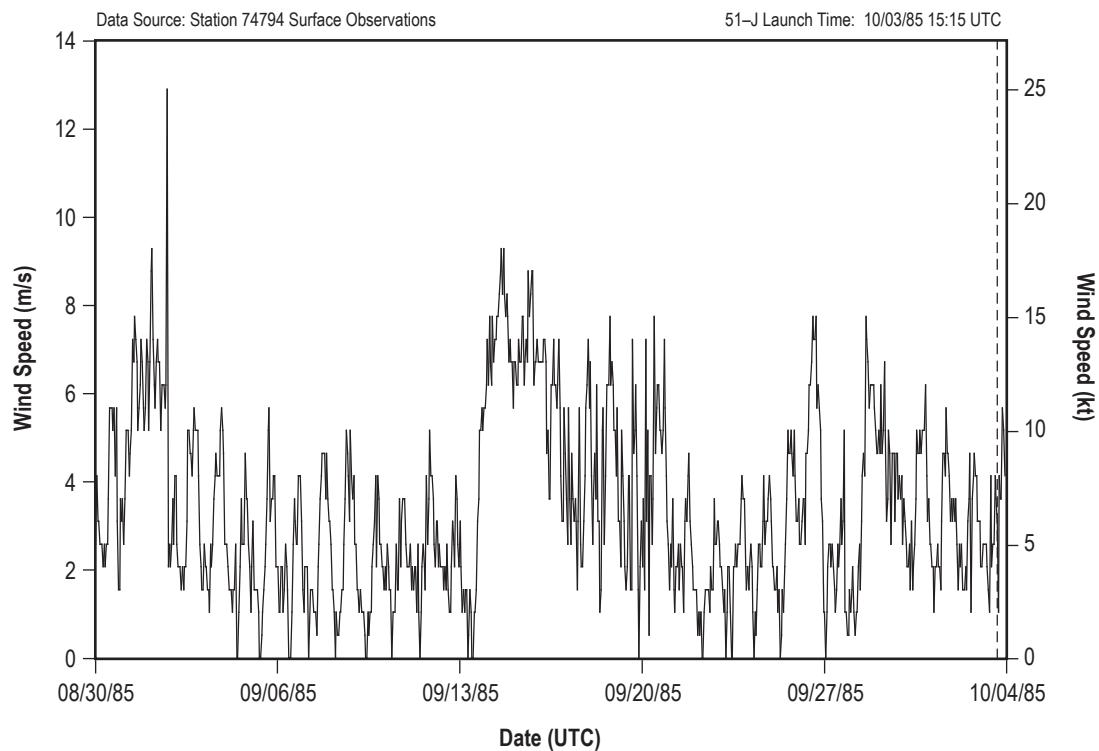


Figure 129. 51-J hourly surface wind speed.

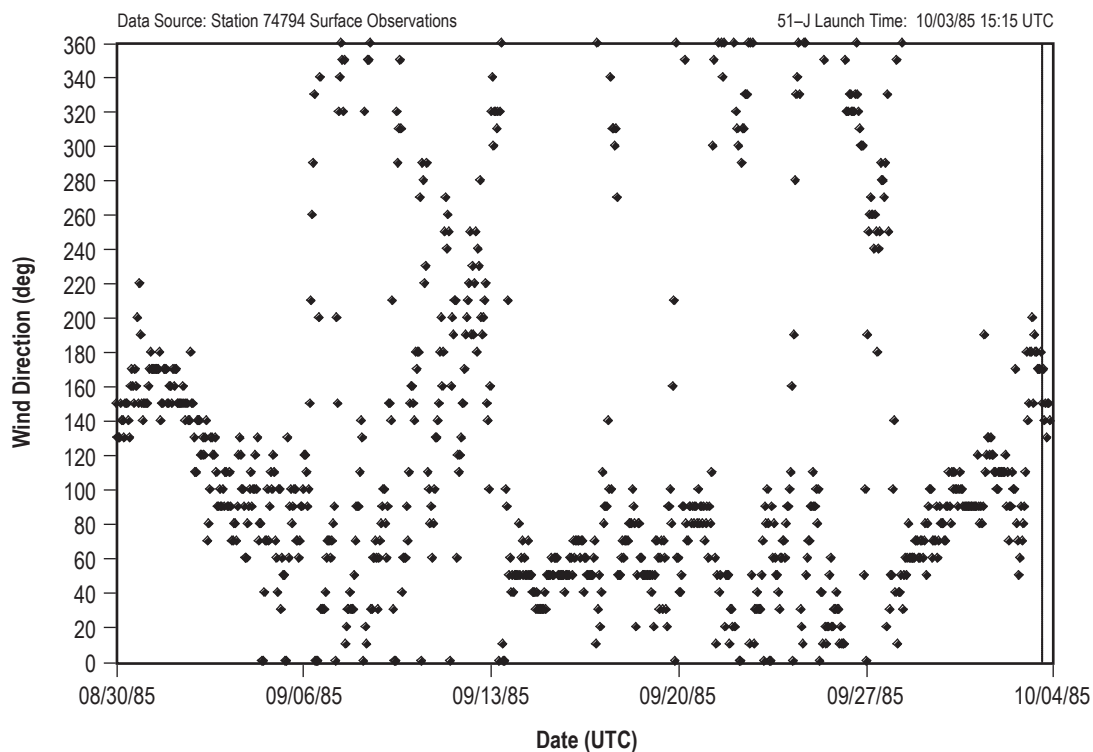


Figure 130. 51-J hourly surface wind direction.

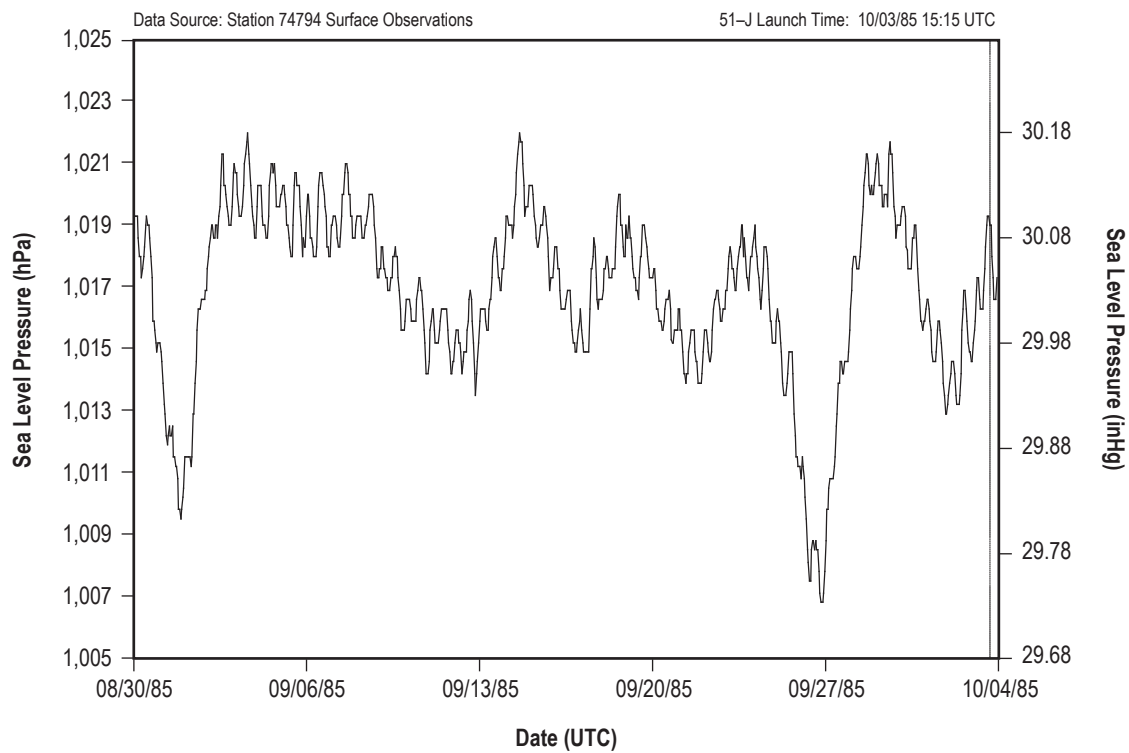


Figure 131. 51-J hourly sea level pressure.

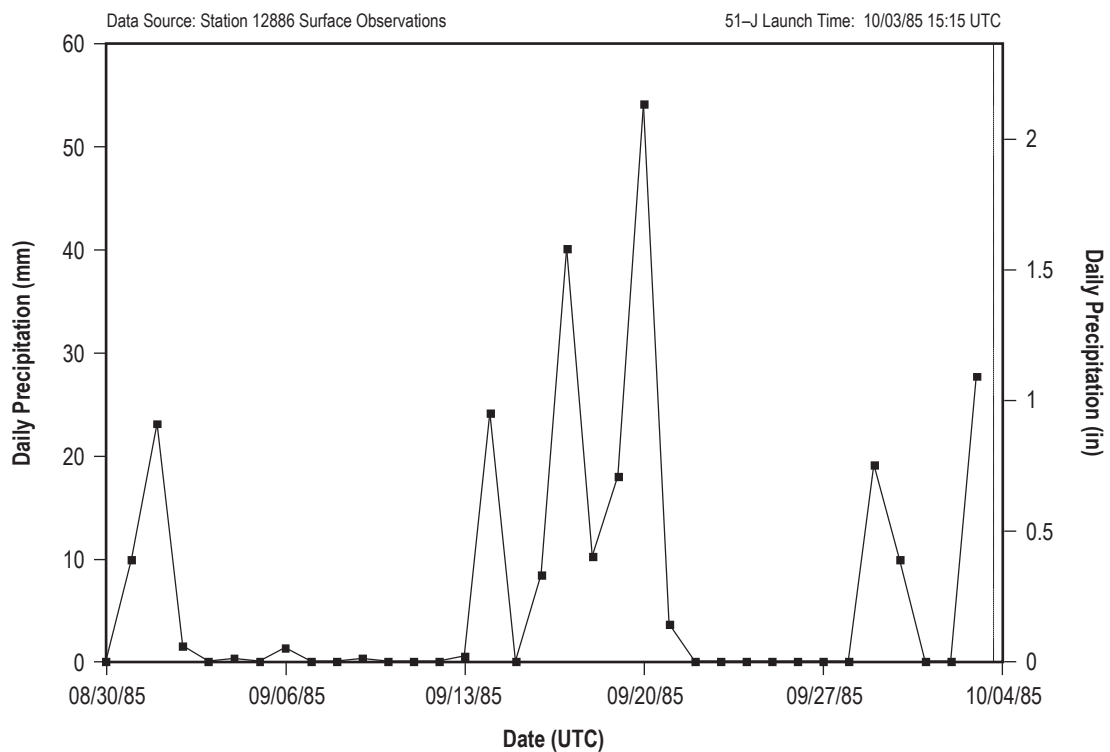


Figure 132. 51-J daily precipitation totals.

## 5.22 61-A

61-A was the ninth mission for *Challenger* (OV-099). It rolled out to pad 39A on October 16, 1985. 61-A was exposed on the pad for 15 days and launched on October 30, 1985, at 17:00 UTC.

### 5.22.1 61-A Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 61-A.

### 5.22.2 61-A L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 61-A are shown in table 47. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 47.

Table 47. 61-A L-0 surface observations.

Temperature	27.8 °C (82 °F)
Relative humidity	72%
Sea level pressure	1,006.4 hPa (29.72 inHg)
Wind speed	3.9 m/s (7.5 kt) (1-min average)
Wind direction	217° (1-min average)
Sky condition	3/8 cumulus at 853 m (2,800 ft); 7/8 cirrus at 9,144 m (30,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.22.3 61-A Pad Exposure Period Surface Meteorological Parameters

Figures 133–138 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 61-A pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 48. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 48. 61-A pad exposure period hourly extremes.

Minimum temperature	19.4 °C (67 °F)
Maximum temperature	31.1 °C (88 °F)
Minimum relative humidity	58%
Maximum relative humidity	100%
Minimum sea level pressure	1,004.1 hPa (29.65 inHg)
Maximum sea level pressure	1,025.1 hPa (30.27 inHg)
Maximum wind speed and associated wind direction	7.2 m/s (14 kt) 80°
Total precipitation	79.2 mm (3.12 in)

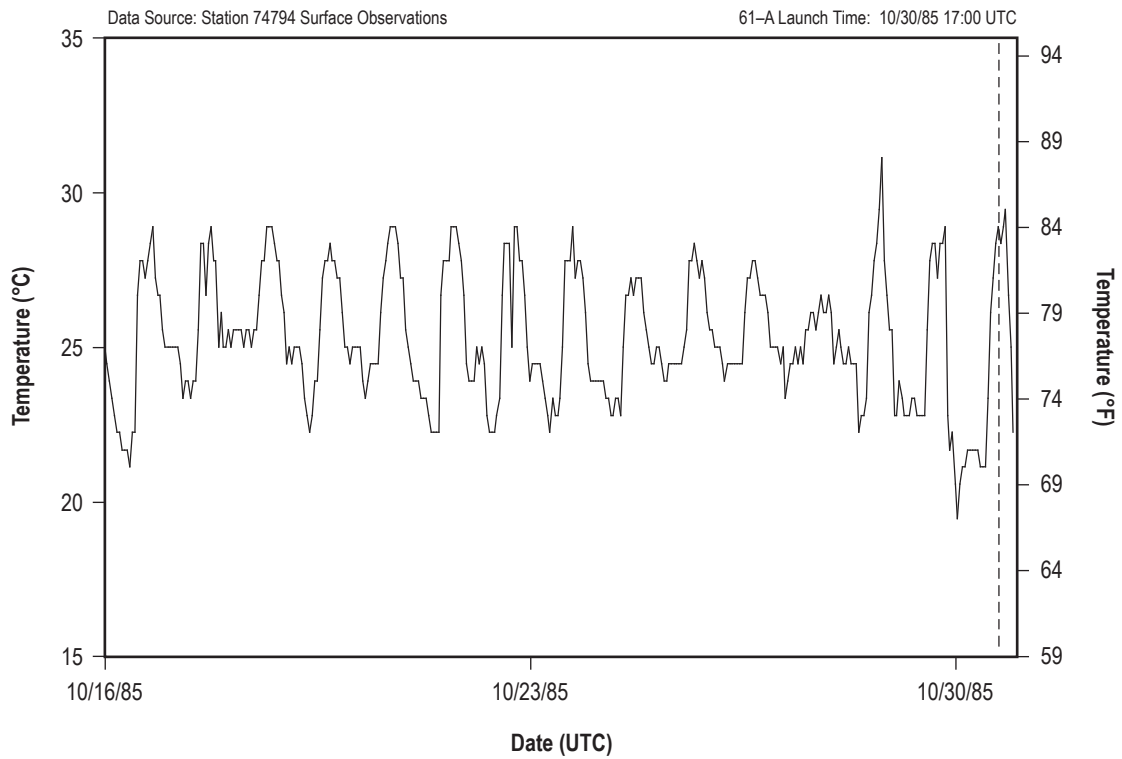


Figure 133. 61-A hourly surface temperature.

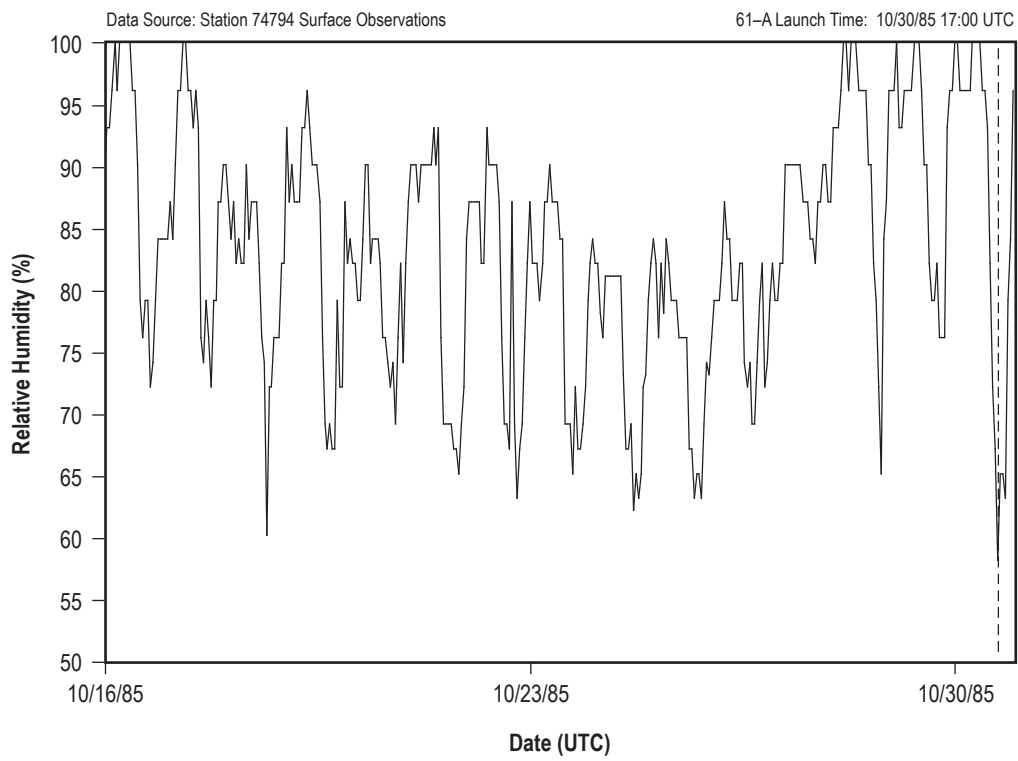


Figure 134. 61-A hourly surface relative humidity.

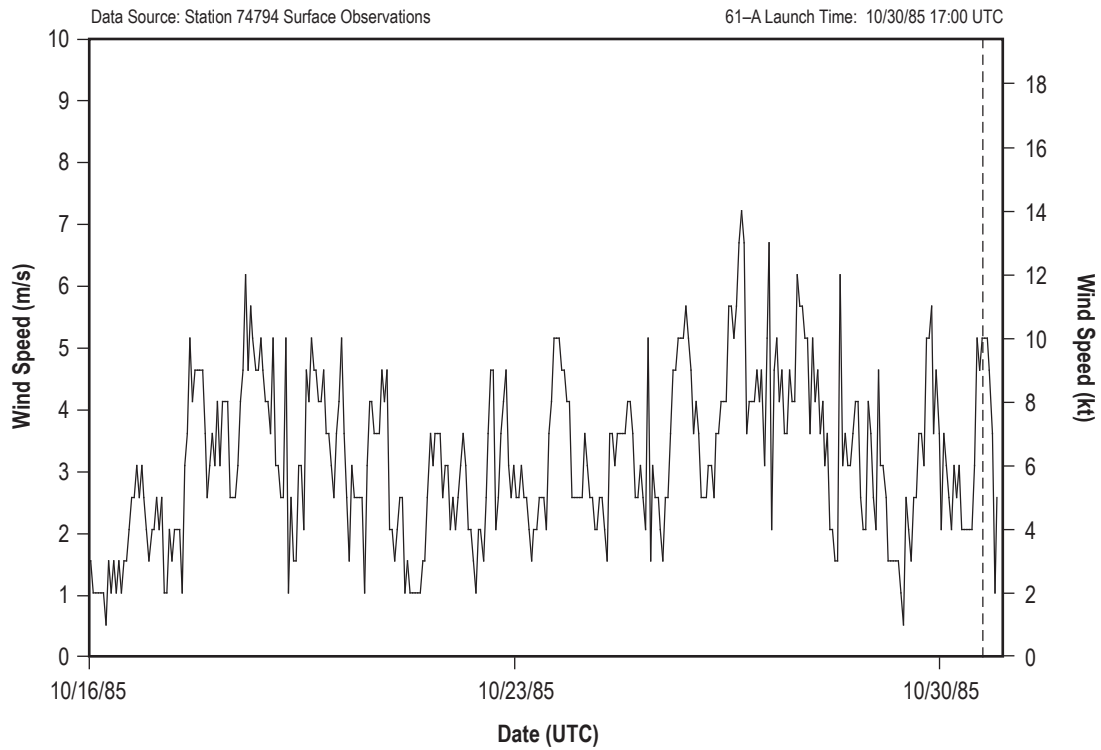


Figure 135. 61-A hourly surface wind speed.

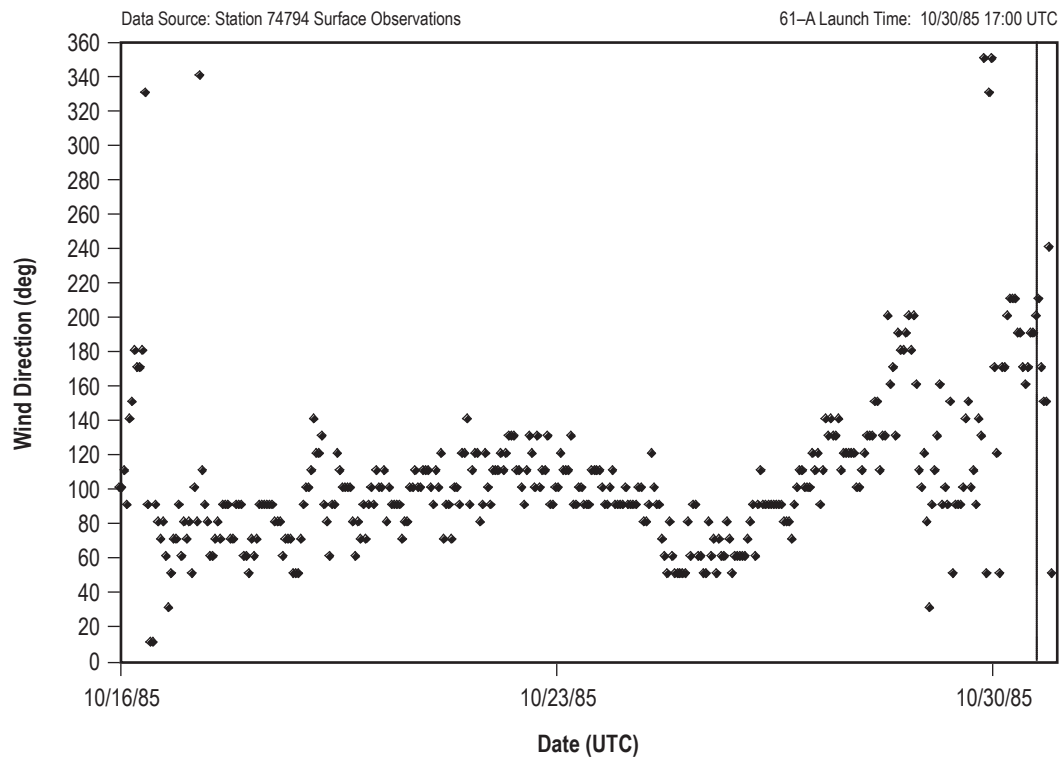


Figure 136. 61-A hourly surface wind direction.



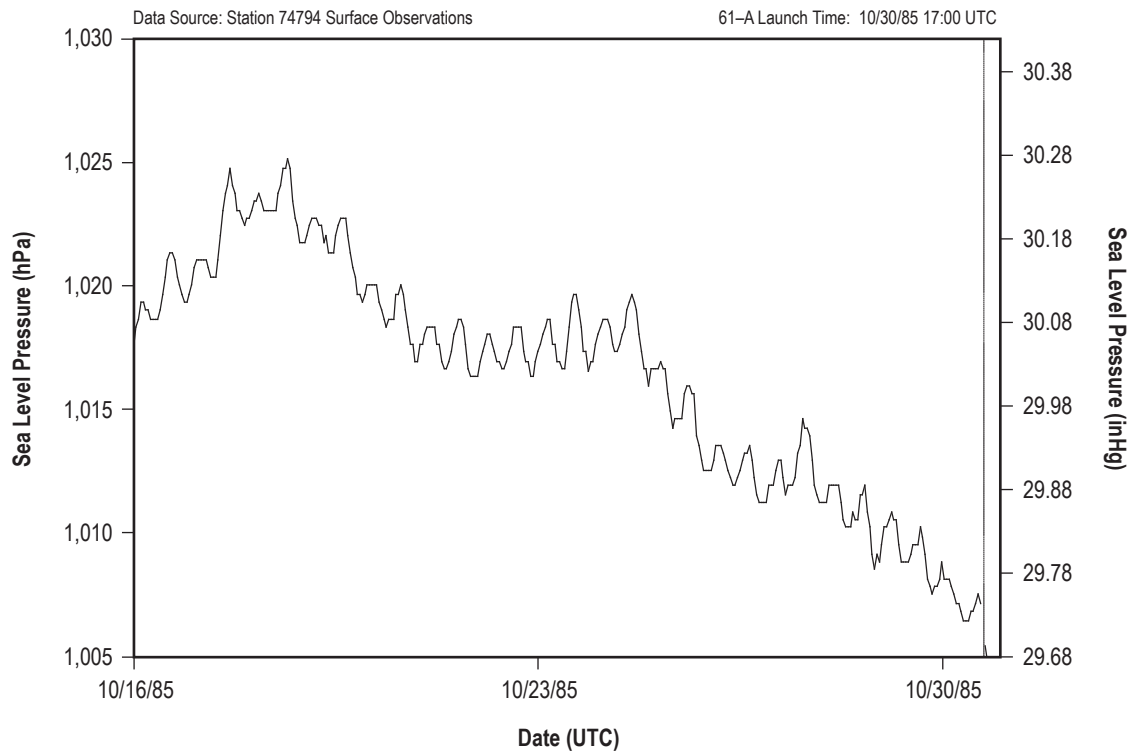


Figure 137. 61-A hourly sea level pressure.

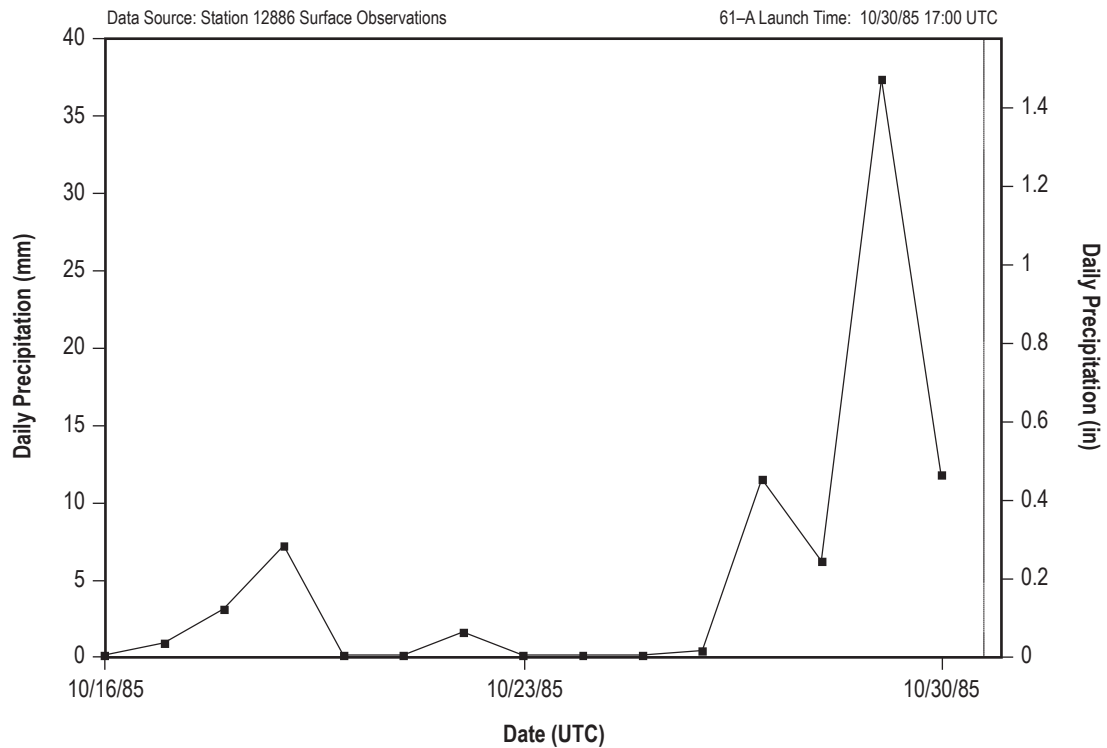


Figure 138. 61-A daily precipitation totals.

## 5.23 61-B

61-B was the second mission for *Atlantis* (OV-104). It rolled out to pad 39A on November 12, 1985. 61-B was exposed on the pad for 15 days and launched on November 27, 1985, at 00:29 UTC.

### 5.23.1 61-B Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 61-B.

### 5.23.2 61-B L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 61-B are shown in table 49. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 49

Table 49. 61-B L-0 surface observations.

Temperature	22.7 °C (72.8 °F)
Relative humidity	81%
Sea level pressure	1,020.9 hPa (30.15 inHg)
Wind speed	3.1 m/s (6 kt) (1-min average)
Wind direction	165° (1-min average)
Sky condition	1/8 cumulus at 914 m (3,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.23.3 61-B Pad Exposure Period Surface Meteorological Parameters

Figures 139–144 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 61-B pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 50. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 50. 61-B pad exposure period hourly extremes.

Minimum temperature	16.7 °C (62 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	58%
Maximum relative humidity	100%
Minimum sea level pressure	1,013.5 hPa (29.93 inHg)
Maximum sea level pressure	1,025.1 hPa (30.27 inHg)
Maximum wind speed and associated wind direction	8.2 m/s (16 kt) 150°
Total precipitation	4.8 mm (0.19 in)

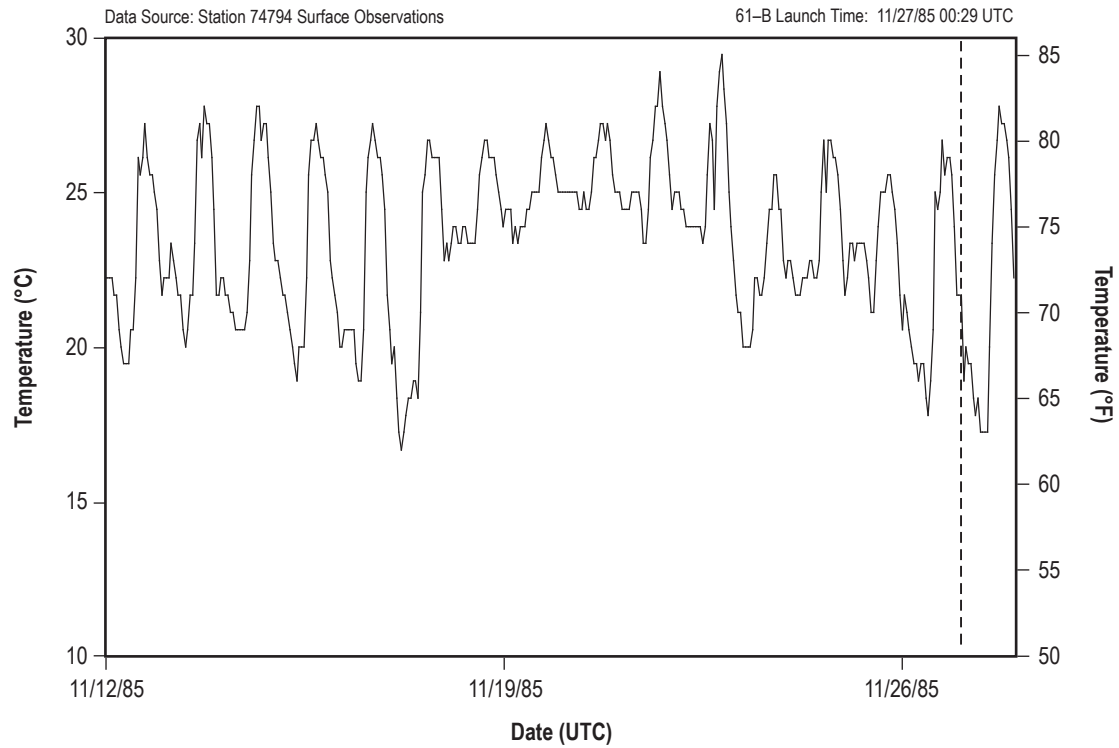


Figure 139. 61-B hourly surface temperature.

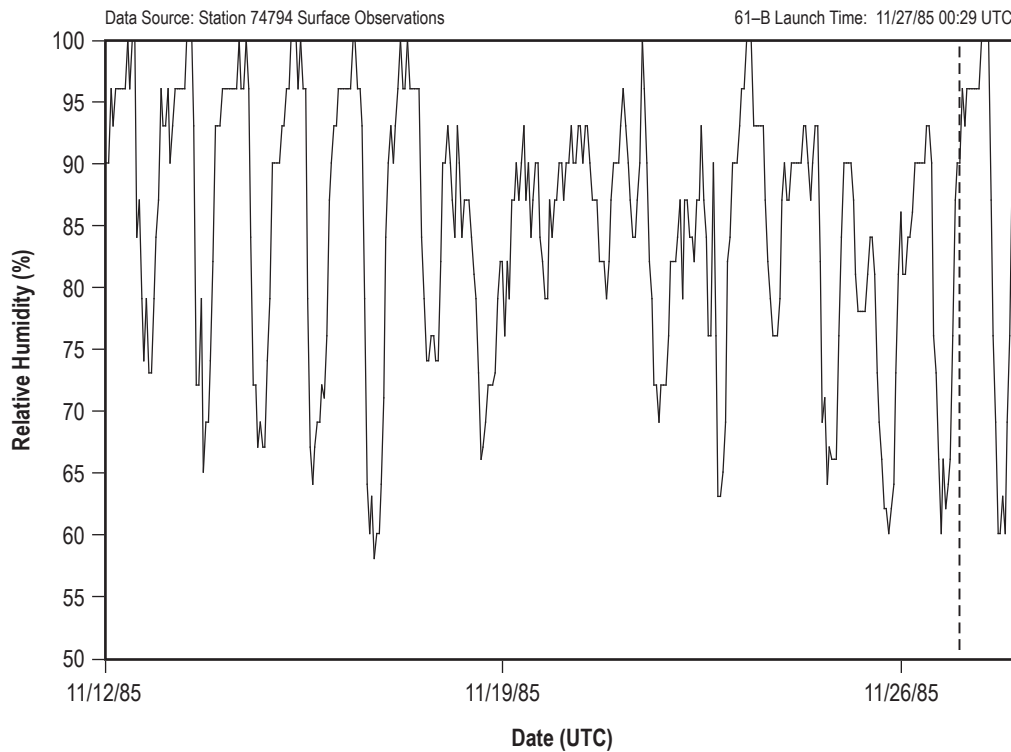


Figure 140. 61-B hourly surface relative humidity.

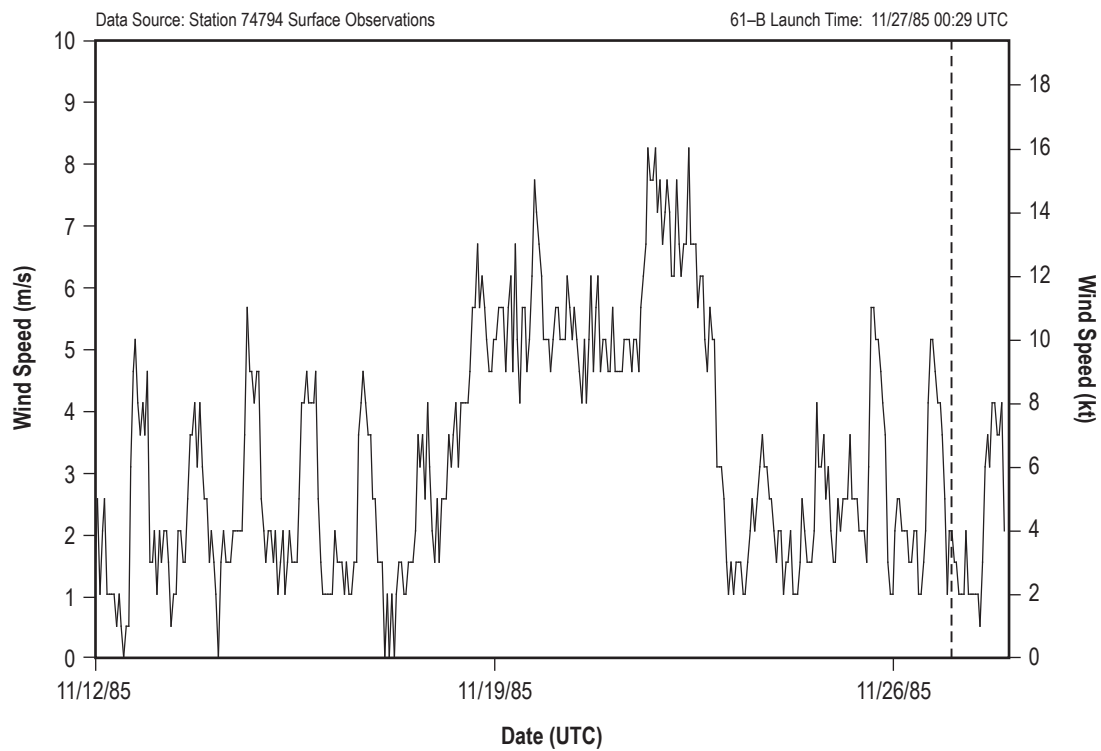


Figure 141. 61-B hourly surface wind speed.

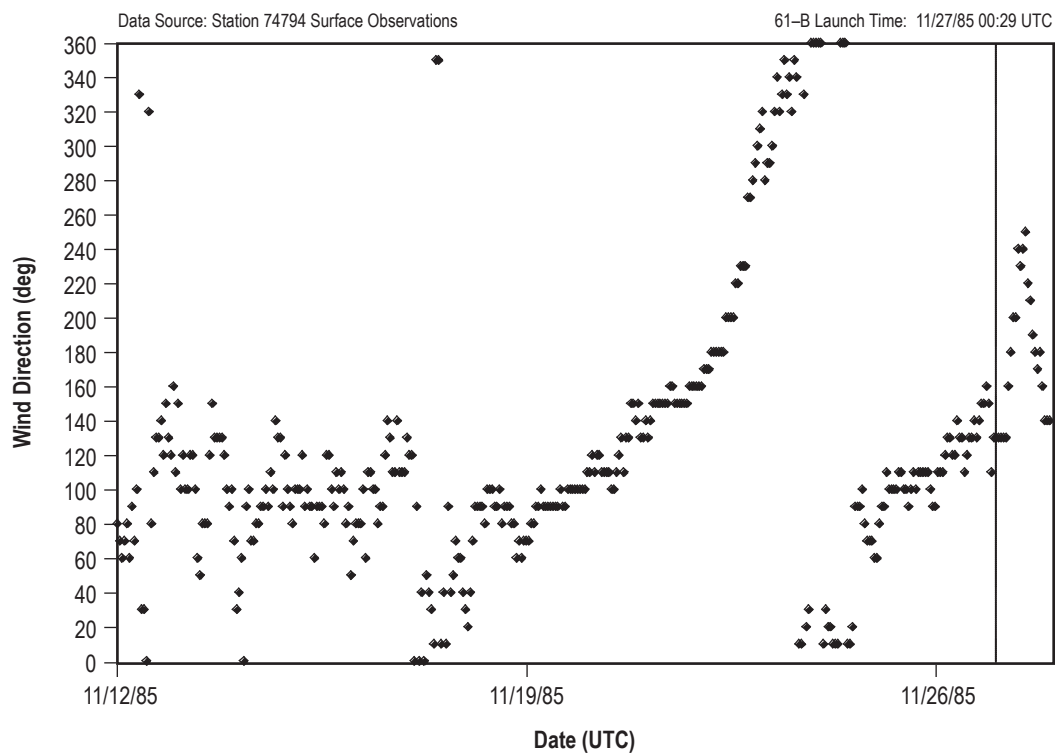


Figure 142. 61-B hourly surface wind direction.

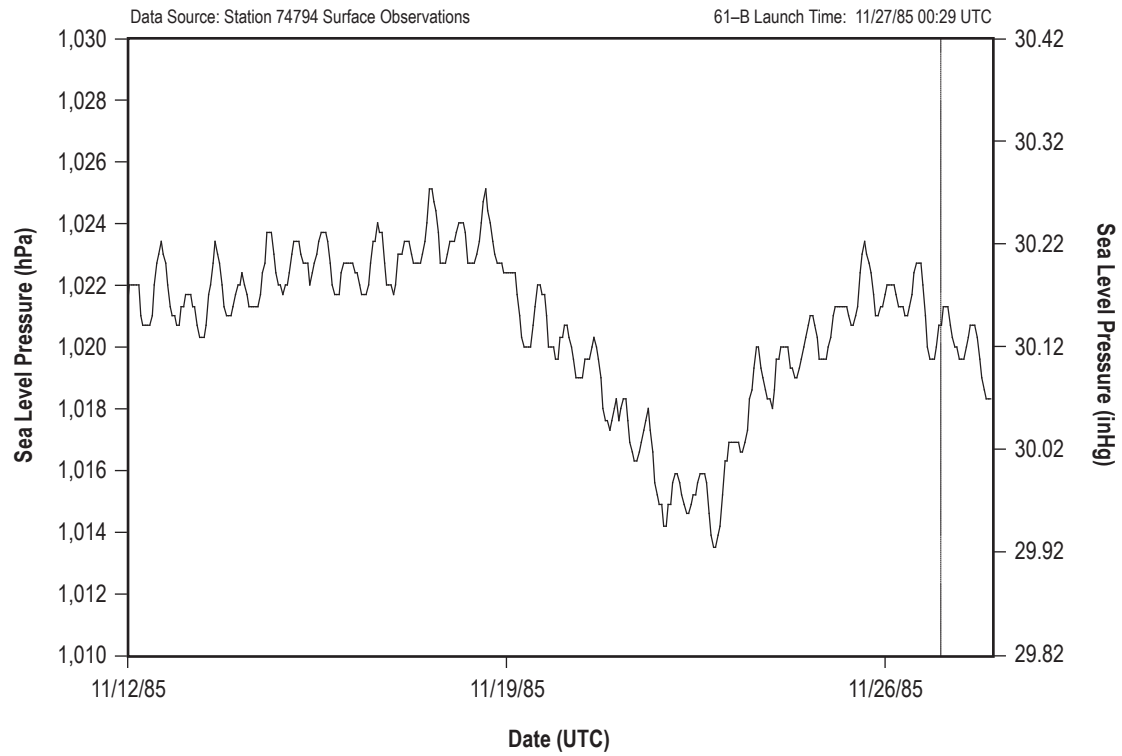


Figure 143. 61-B hourly sea level pressure.

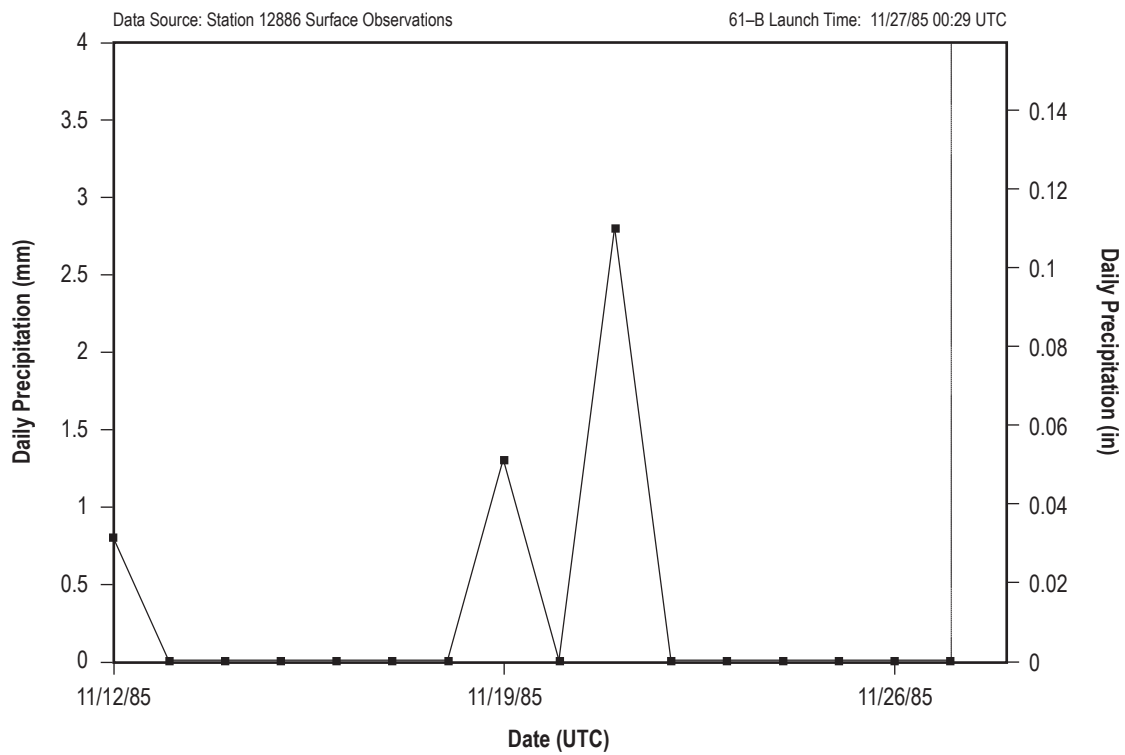


Figure 144. 61-B daily precipitation totals.

## 5.24 61-C

61-C was the seventh mission for *Columbia* (OV-102). It rolled out to pad 39A on December 2, 1985. 61-C was exposed on the pad for 42 days and launched on January 12, 1986, at 11:55 UTC.

### 5.24.1 61-C Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 61-C.

### 5.24.2 61-C L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 61-C are shown in table 51. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 51.

Table 51. 61-C L-0 surface observations.

Temperature	12 °C (53.6 °F)
Relative humidity	84%
Sea level pressure	1,021.3 hPa (30.16 inHg)
Wind speed	4.7 m/s (9.1 kt) (1-min average)
Wind direction	323° (1-min average)
Sky condition	1/8 stratocumulus at 1,067 m (3,500 ft);
Visibility	16.1 km (8.7 nmi)

### 5.24.3 61-C Pad Exposure Period Surface Meteorological Parameters

Figures 145–150 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 61-C pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 52. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 52. 61-C pad exposure period hourly extremes.

Minimum temperature	–3.3 °C (26 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	26%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.5 hPa (29.75 inHg)
Maximum sea level pressure	1,032.2 hPa (30.48 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 350°
Total precipitation	242.1 mm (9.53 in)

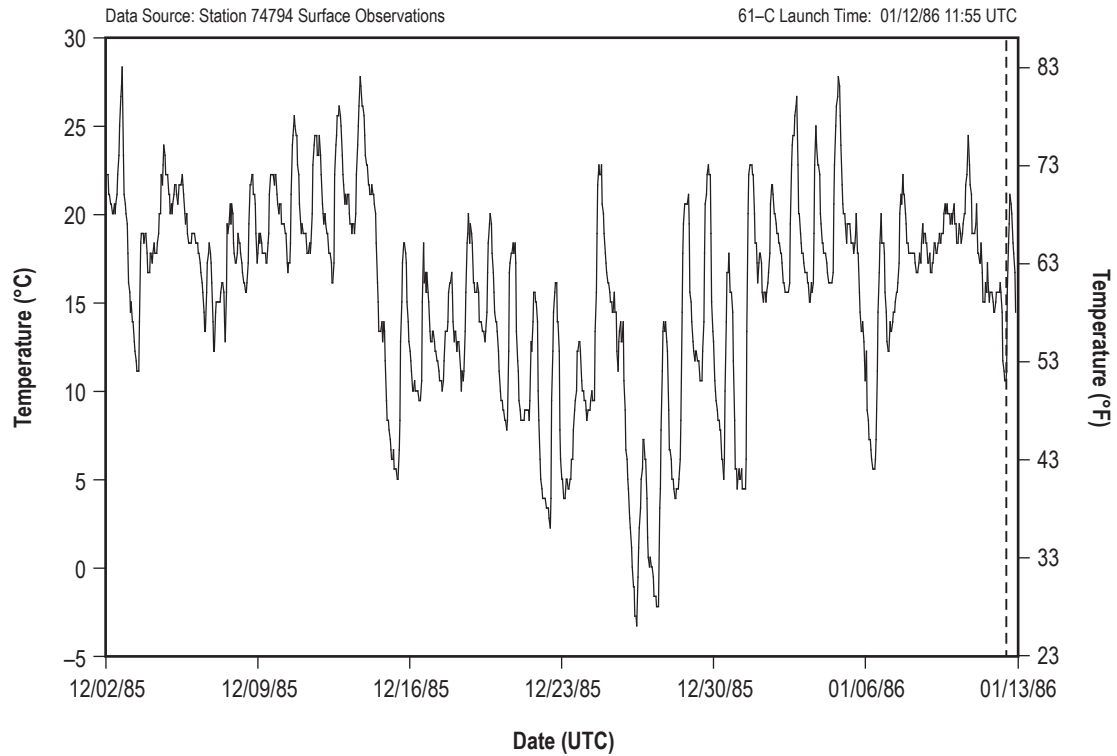


Figure 145. 61-C hourly surface temperature.

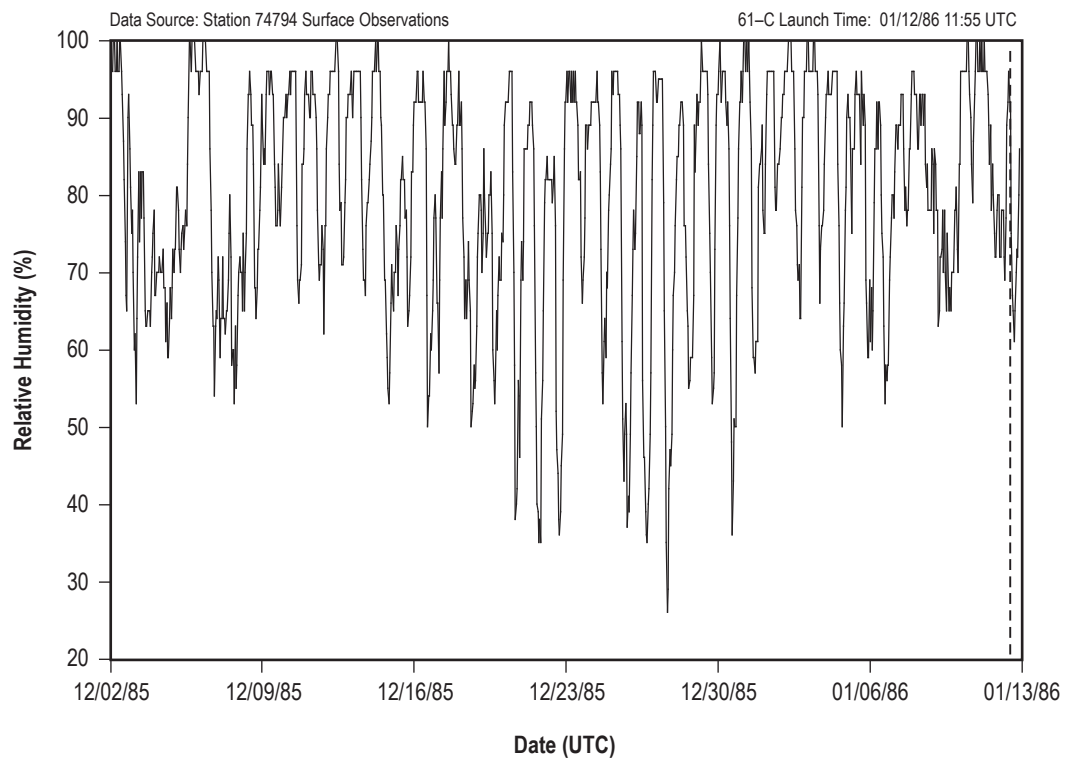


Figure 146. 61-C hourly surface relative humidity.

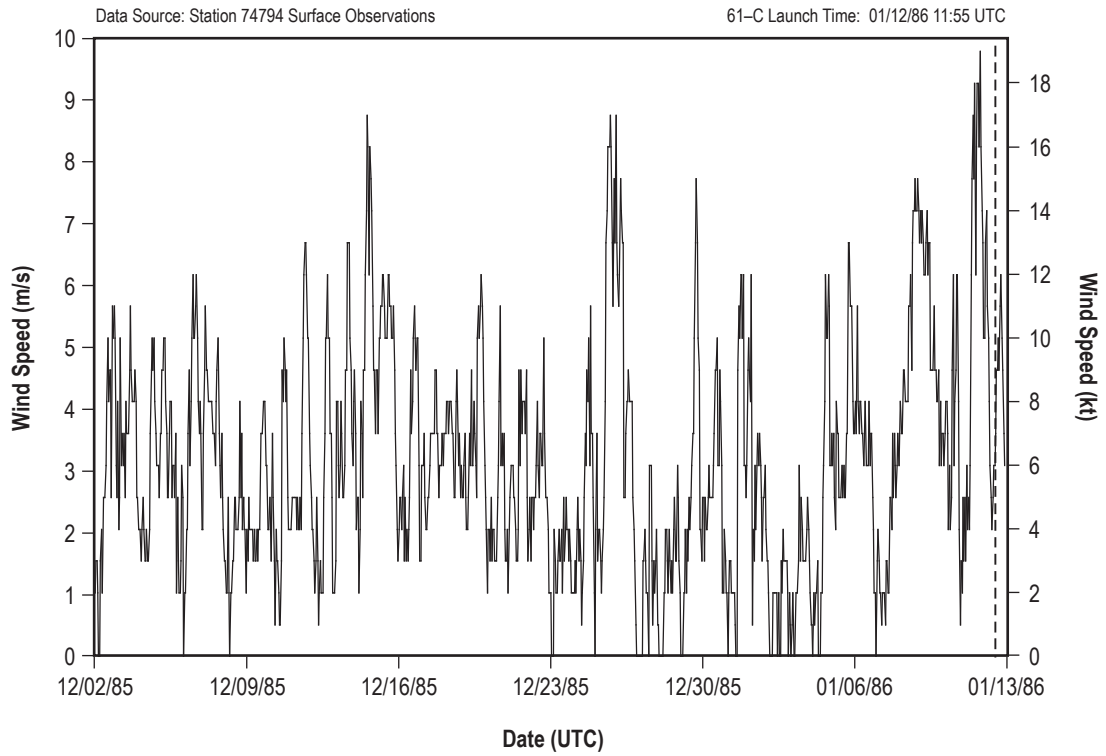


Figure 147. 61-C hourly surface wind speed.

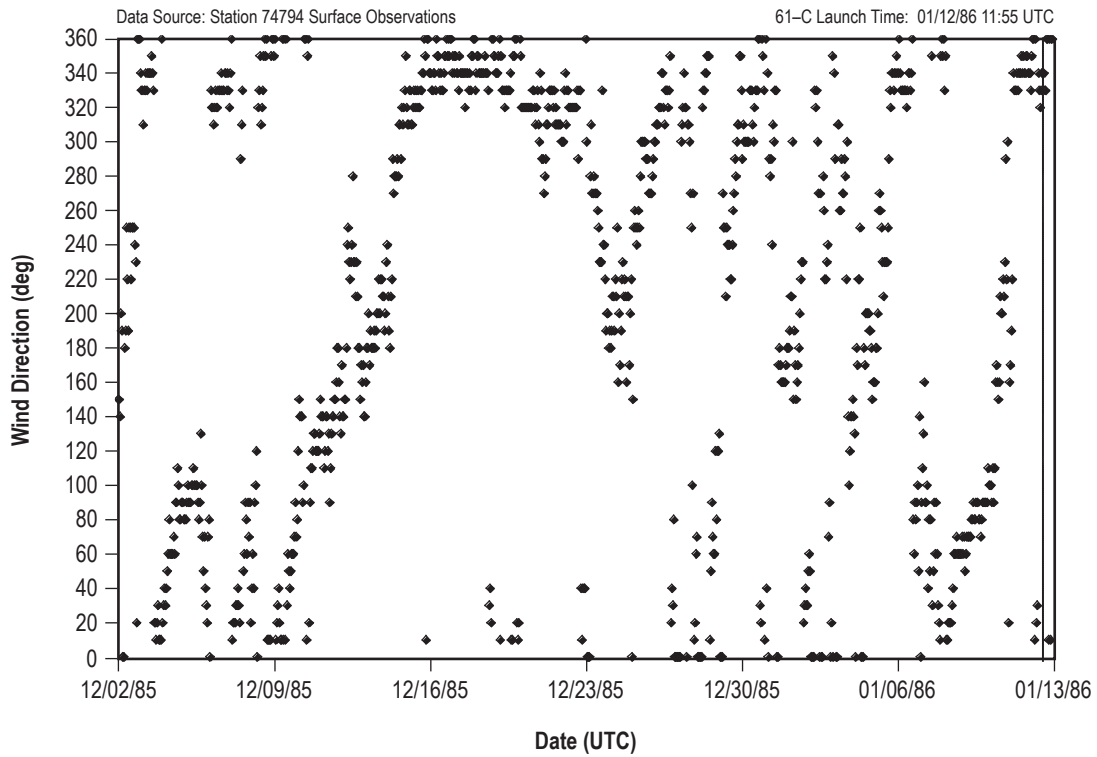


Figure 148. 61-C hourly surface wind direction.



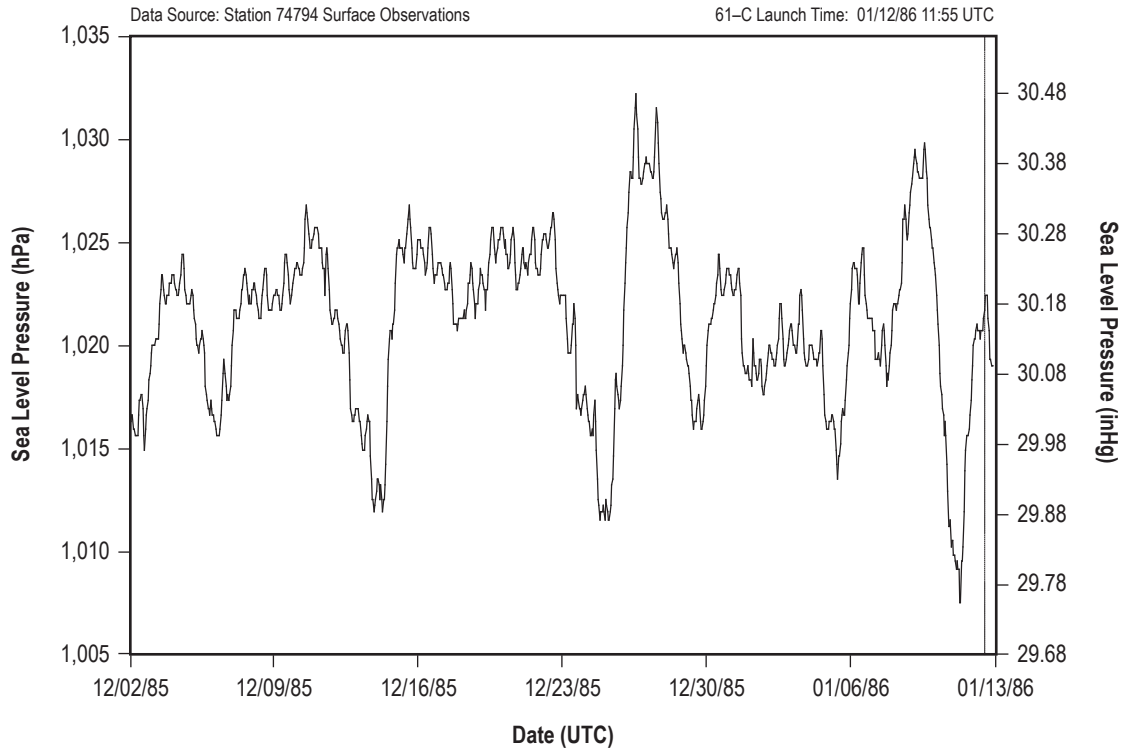


Figure 149. 61-C hourly sea level pressure.

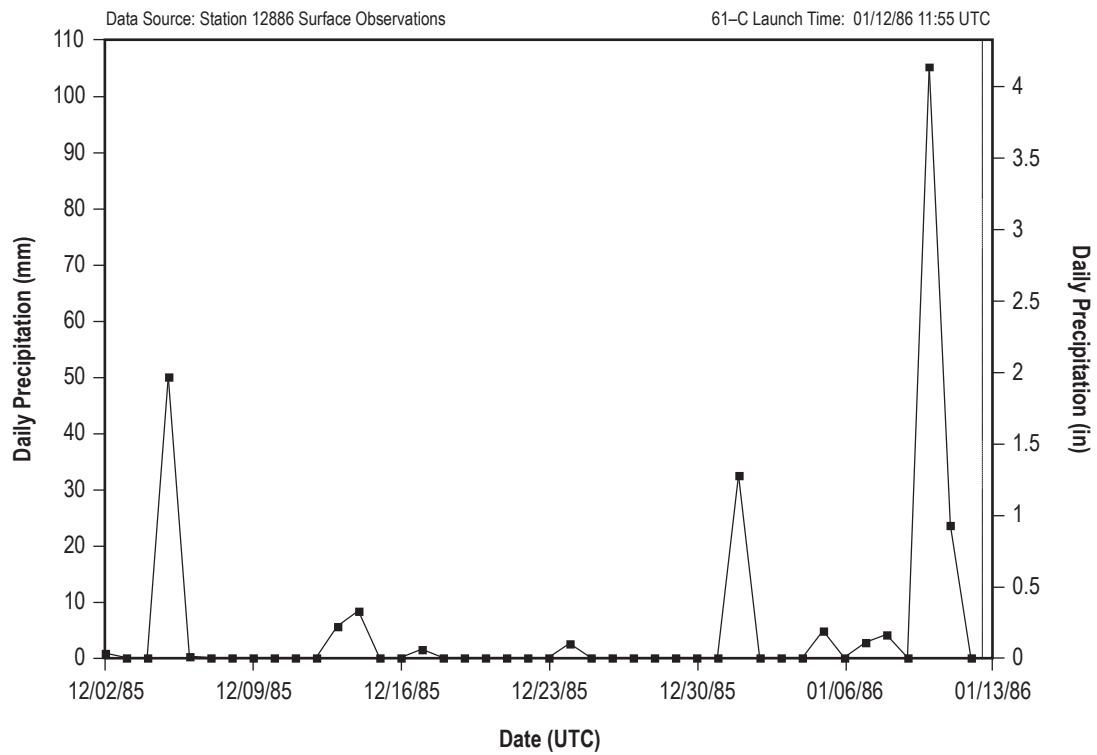


Figure 150. 61-C daily precipitation totals.

## 5.25 51-L

51-L was the 10th mission for *Challenger* (OV-099). It rolled out to pad 39B on December 22, 1985. 51-L was exposed on the pad for 38 days and launched on January 28, 1986, at 16:38 UTC.

### 5.25.1 51-L Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for 51-L.

### 5.25.2 51-L L-0 Surface Observations

The surface meteorological parameters observed at L-0 for 51-L are shown in table 53. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 53.

Table 53. 51-L L-0 surface observations.

Temperature	2.6 °C (36.7 °F)
Relative humidity	27%
Sea level pressure	1,026.1 hPa (30.3 inHg)
Wind speed	6.1 m/s (11.9 kt) (1-min average)
Wind direction	331° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi)

### 5.25.3 51-L Pad Exposure Period Surface Meteorological Parameters

Figures 151–156 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the 51-L pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 54. All data in this section were collected at station 74794, except for precipitation, which was measured at station 12886.

Table 54. 51-L pad exposure period hourly extremes.

Minimum temperature	–3.9 °C (25 °F)
Maximum temperature	27.8 °C (82 °F)
Minimum relative humidity	18%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,032.2 hPa (30.48 inHg)
Maximum wind speed and associated wind direction	13.9 m/s (27 kt) 290°
Total precipitation	182.4 mm (7.18 in)

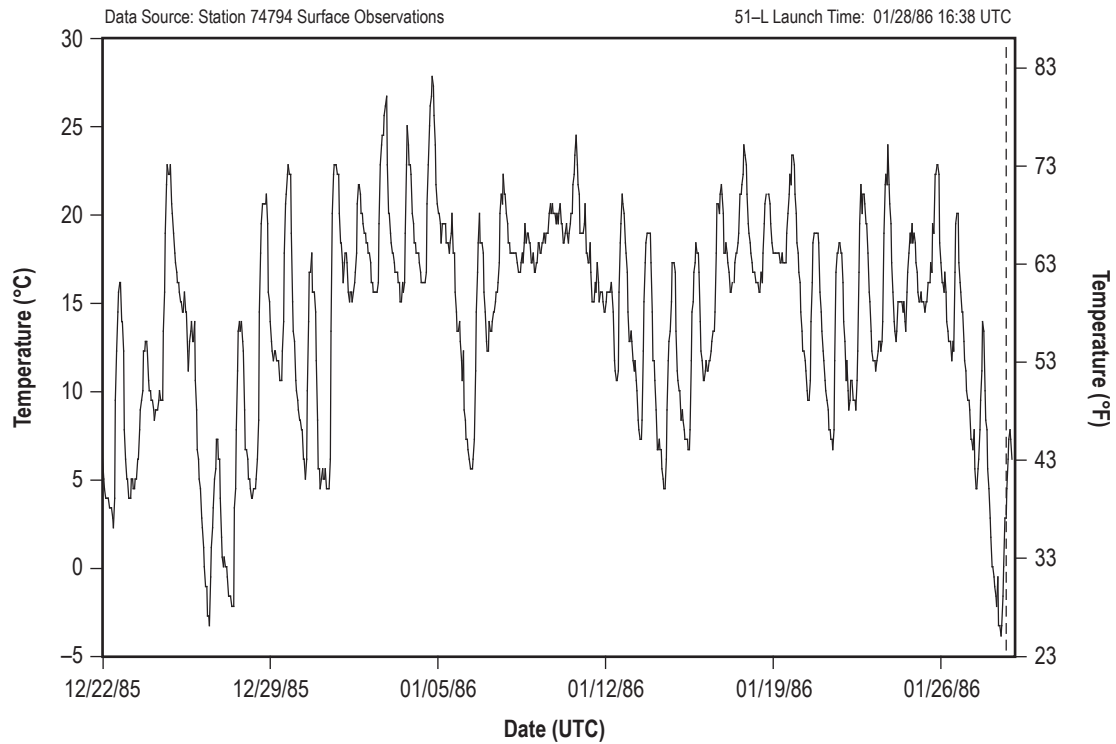


Figure 151. 51-L hourly surface temperature.

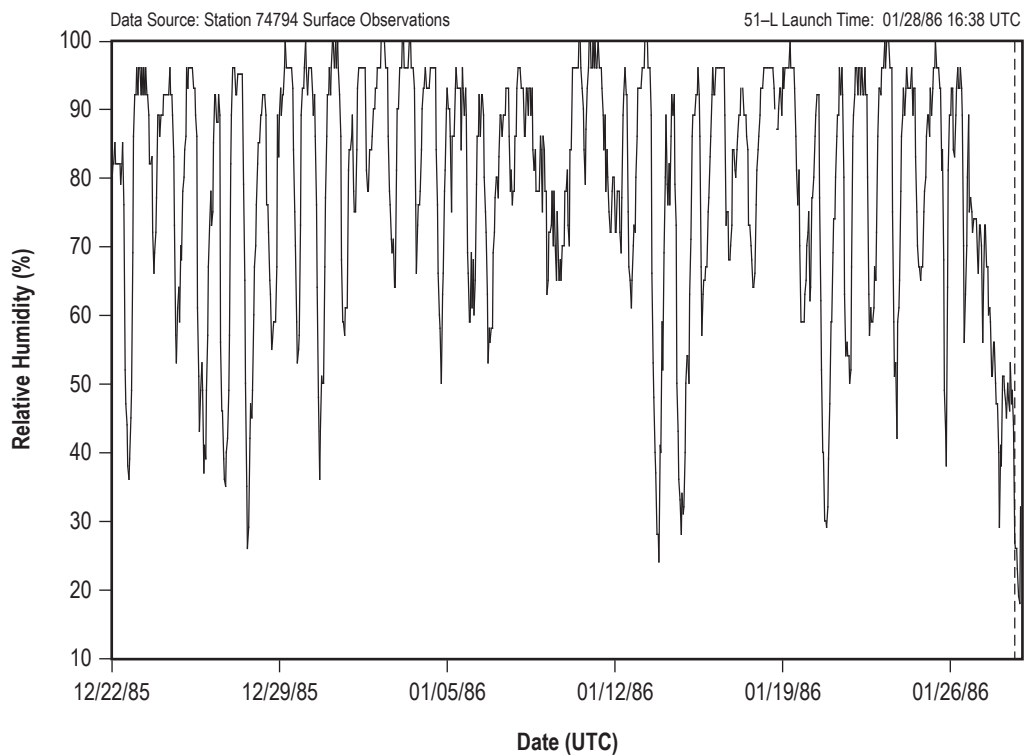


Figure 152. 51-L hourly surface relative humidity.

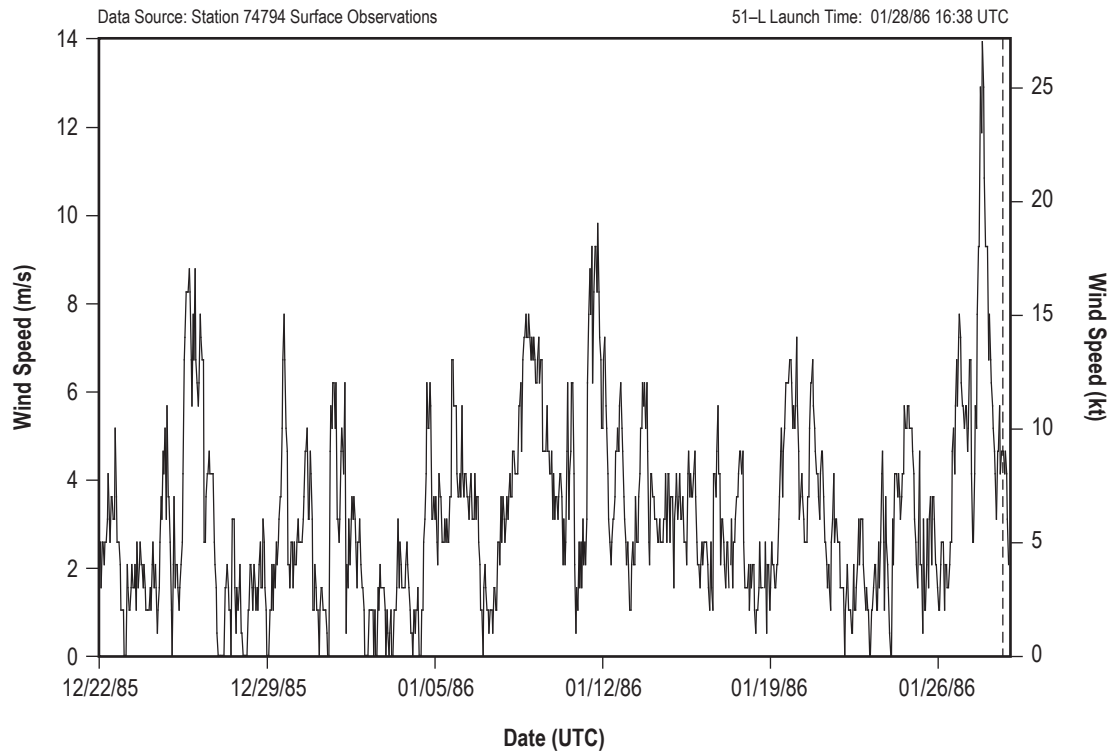


Figure 153. 51-L hourly surface wind speed.

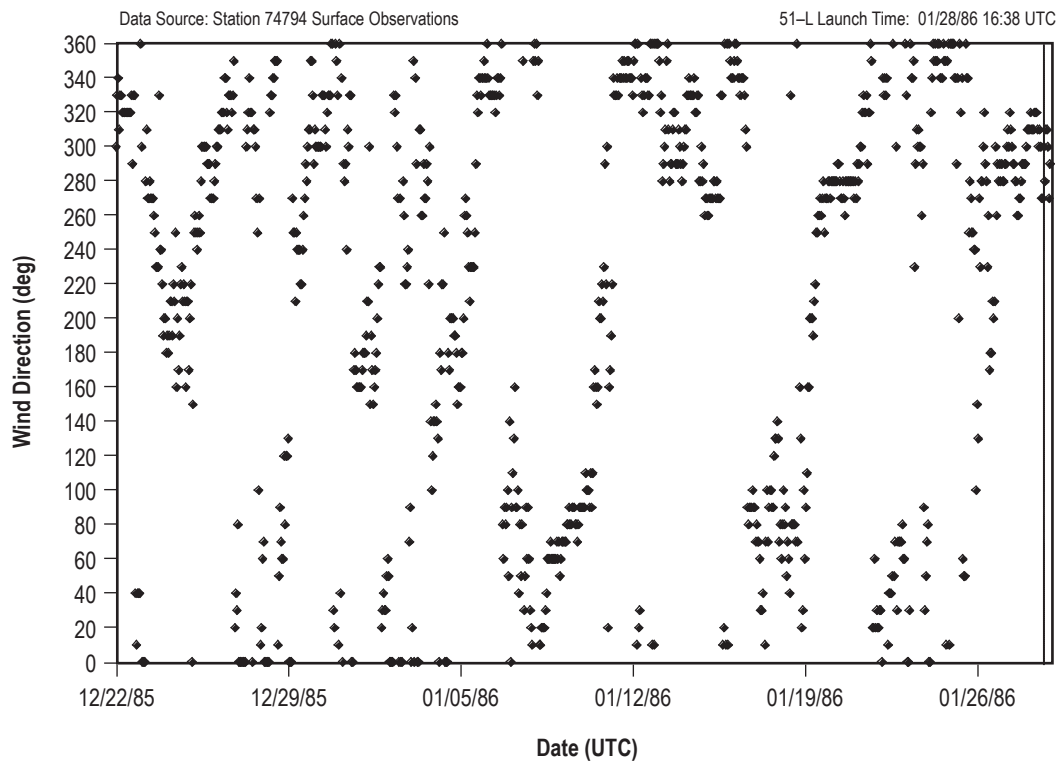


Figure 154. 51-L hourly surface wind direction.

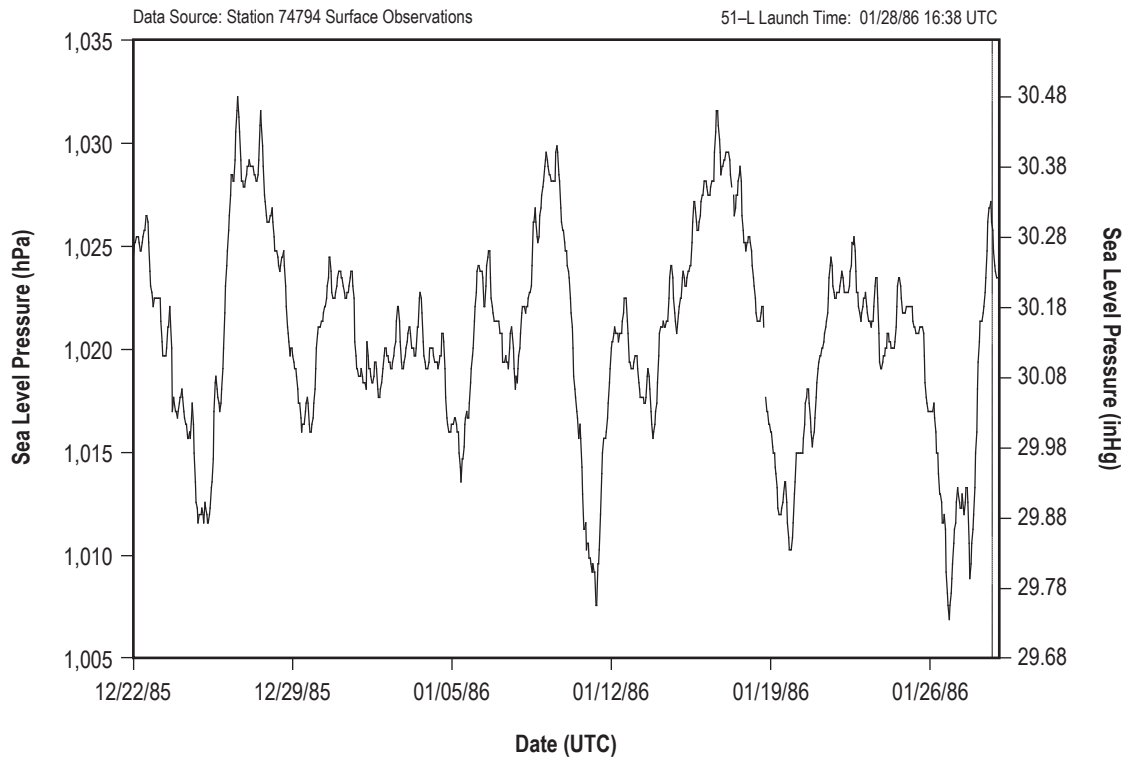


Figure 155. 51-L hourly sea level pressure.

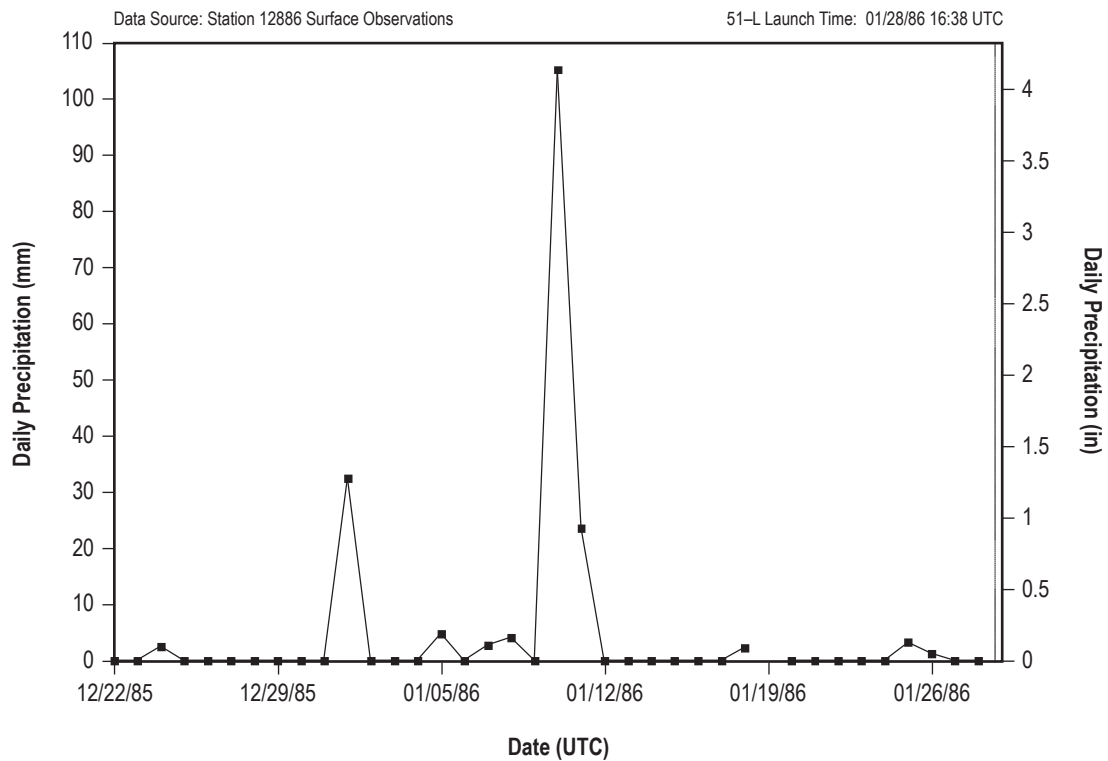


Figure 156. 51-L daily precipitation totals.

## 5.26 STS–26

STS–26 was the seventh mission for *Discovery* (OV–103). It rolled out to pad 39B on July 4, 1988. STS–26 was exposed on the pad for 88 days and launched on September 29, 1988, at 15:37 UTC.

### 5.26.1 STS–26 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–26.

### 5.26.2 STS–26 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–26 are shown in table 55. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 55.

Table 55. STS–26 L–0 surface observations.

Temperature	28.9 °C (84.1 °F)
Relative humidity	56%
Sea level pressure	1,019 hPa (30.09 inHg)
Wind speed	4.2 m/s (8.1 kt) (1-min average)
Wind direction	58° (1-min average)
Sky condition	3/8 cumulonimbus at 762 m (2,500 ft); 2/8 altocumulus at 2,134 m (7,000 ft); 0/8 cirrus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.26.3 STS–26 Pad Exposure Period Surface Meteorological Parameters

Figures 157–162 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–26 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 56. All data in this section were collected at station 12886.

Table 56. STS–26 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	34.4 °C (94 °F)
Minimum relative humidity	38%
Maximum relative humidity	100%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	9.3 m/s (18 kt) 45°
Total precipitation	380.7 mm (14.99 in)

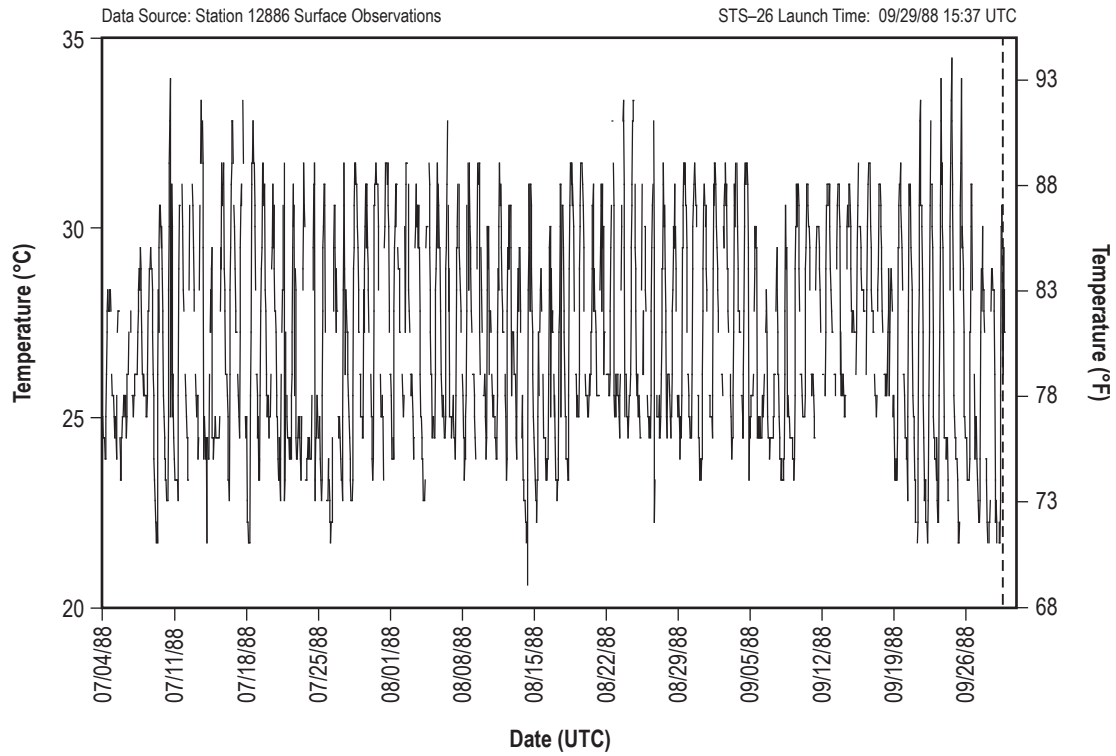


Figure 157. STS-26 hourly surface temperature.

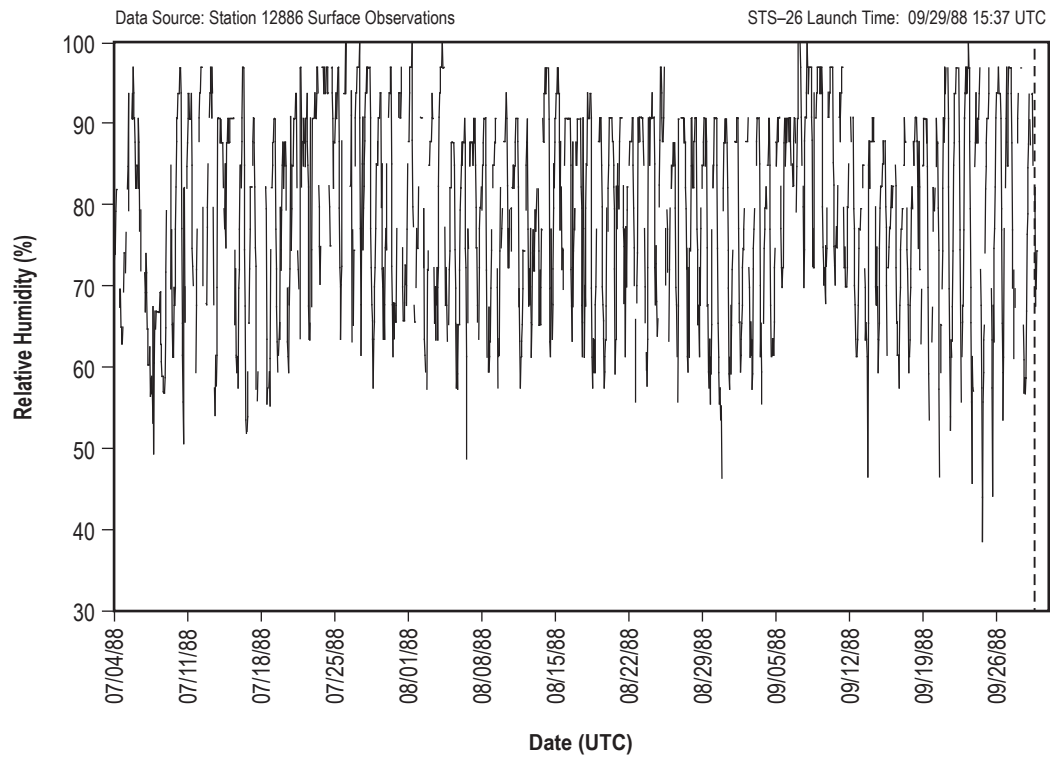


Figure 158. STS-26 hourly surface relative humidity.

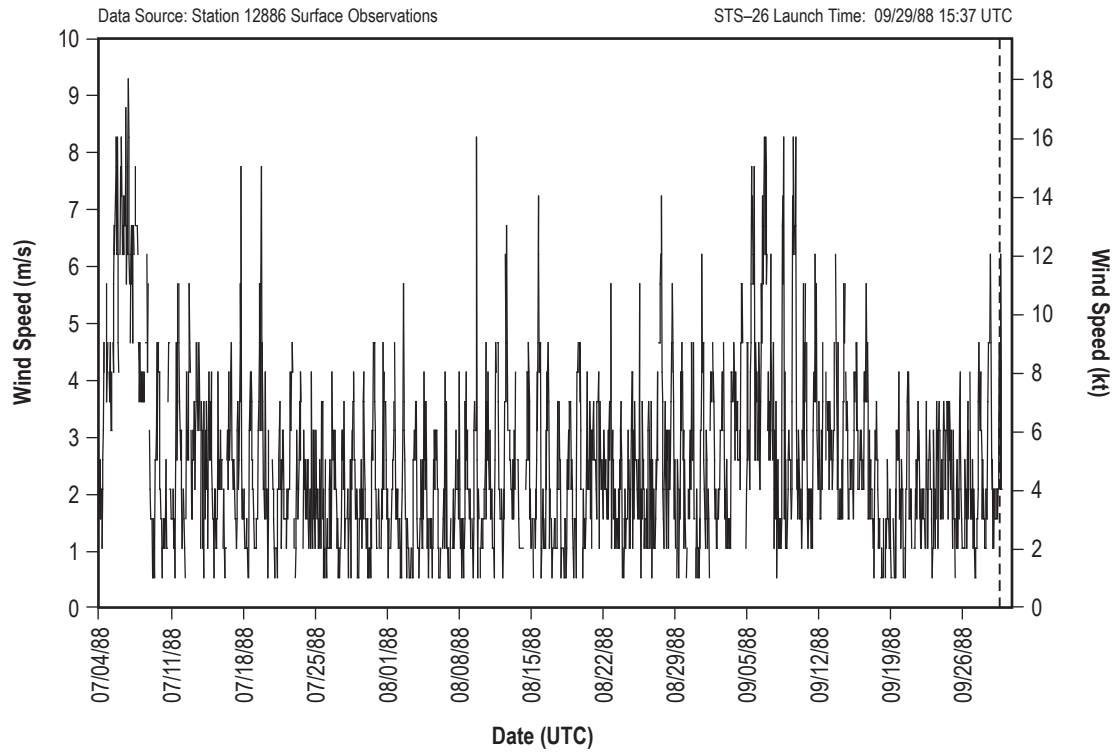


Figure 159. STS-26 hourly surface wind speed.

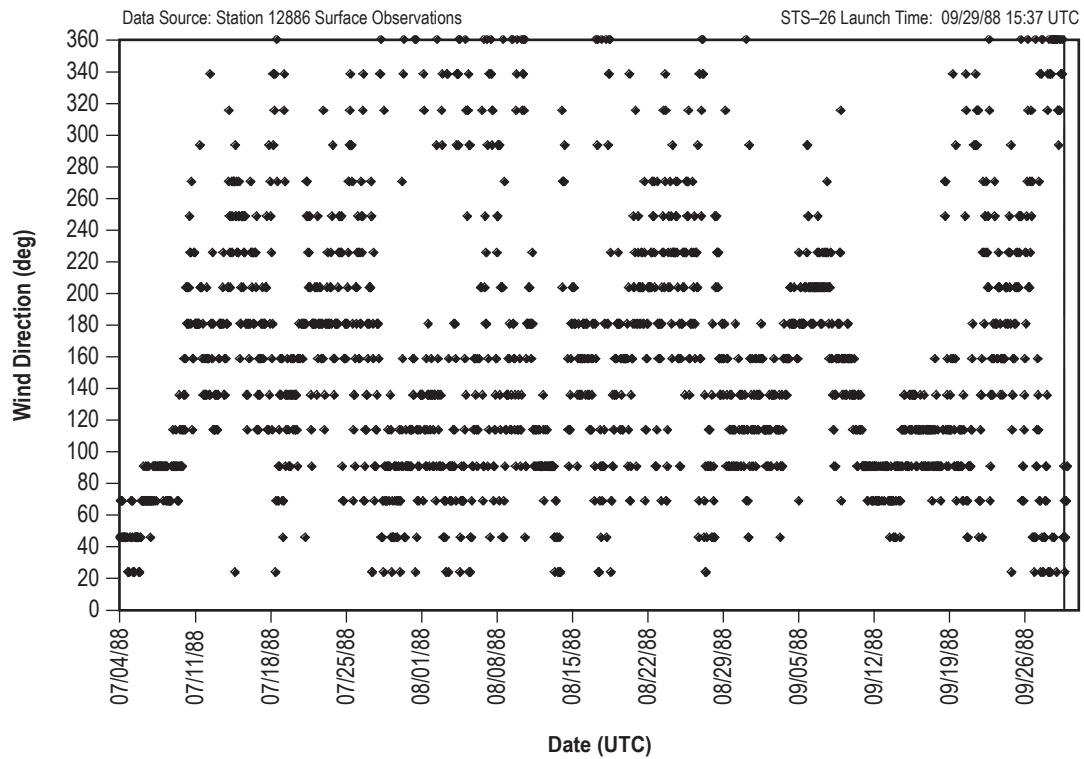


Figure 160. STS-26 hourly surface wind direction.



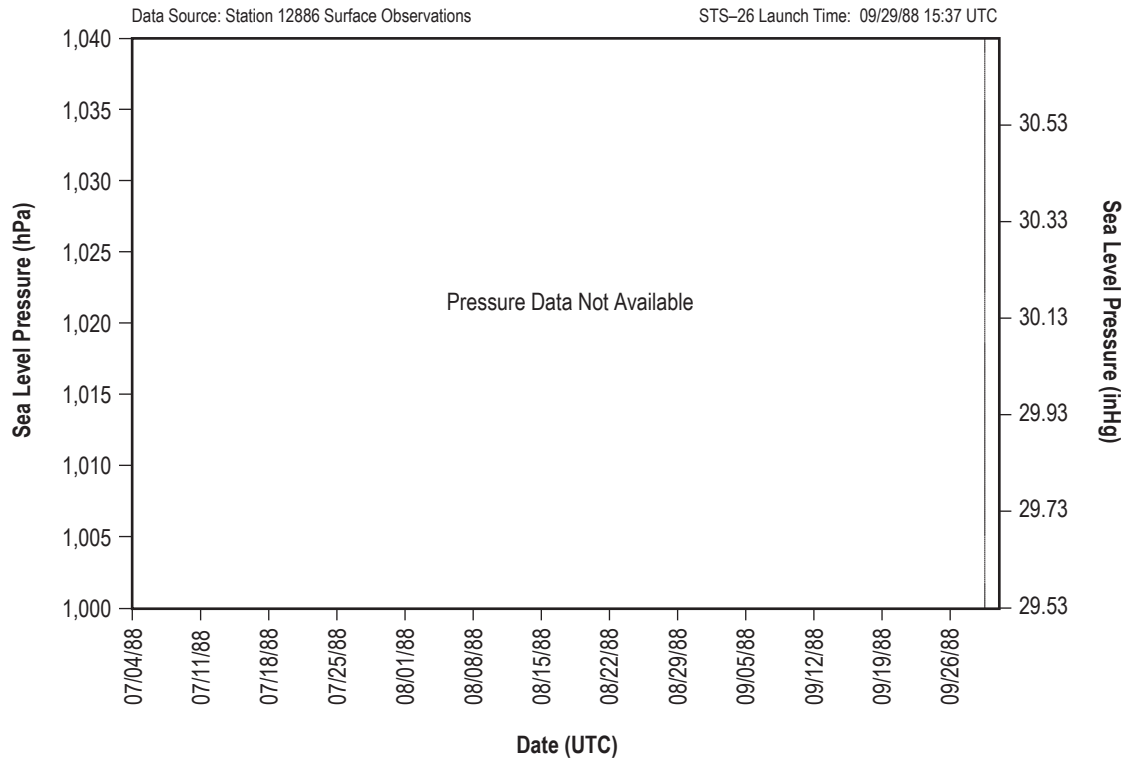


Figure 161. STS-26 hourly sea level pressure.

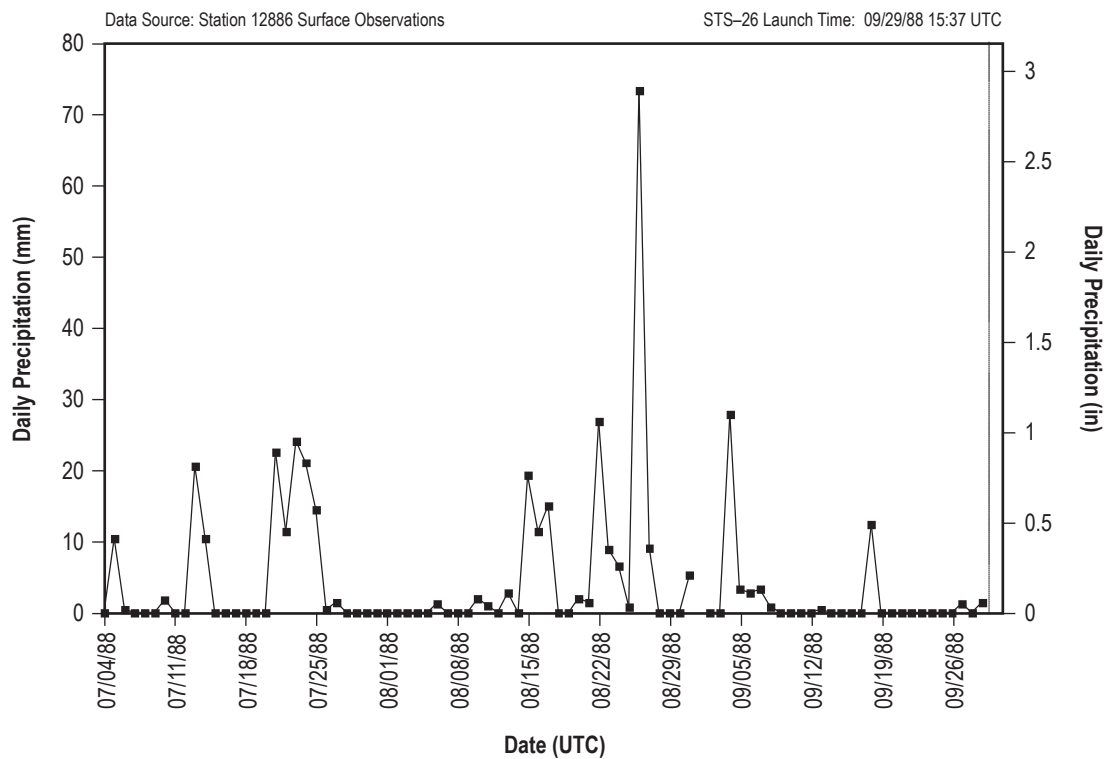


Figure 162. STS-26 daily precipitation totals.

## 5.27 STS–27

STS–27 was the third mission for *Atlantis* (OV–104). It rolled out to pad 39B on November 2, 1988. STS–27 was exposed on the pad for 31 days and launched on December 2, 1988, at 14:31 UTC.

### 5.27.1 STS–27 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–27.

### 5.27.2 STS–27 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–27 are shown in table 57. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad, 39B camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 57.

Table 57. STS–27 L–0 surface observations.

Temperature	13.9 °C (57 °F)
Relative humidity	50%
Sea level pressure	1,027.8 hPa (30.35 inHg)
Wind speed	7.8 m/s (15.1 kt) (1-min average)
Wind direction	314° (1-min average)
Sky condition	2/8 stratocumulus at 1,311 m (4,300 ft); 2/8 cirrus at 9,144 m (30,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.27.3 STS–27 Pad Exposure Period Surface Meteorological Parameters

Figures 163–168 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–27 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 58. All data in this section were collected at station 12886.

Table 58. STS–27 pad exposure period hourly extremes.

Minimum temperature	10.6 °C (51 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	30%
Maximum relative humidity	100%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	10.8 m/s (21 kt) 158°
Total precipitation	109.5 mm (4.31 in)

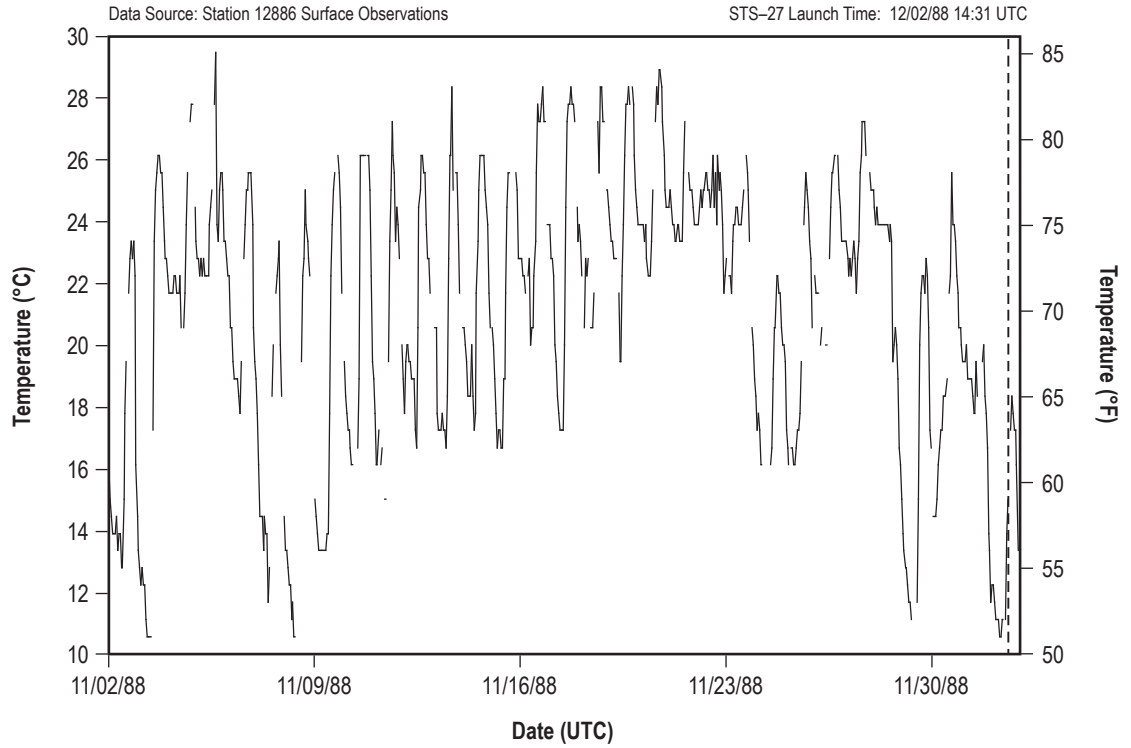


Figure 163. STS-27 hourly surface temperature.

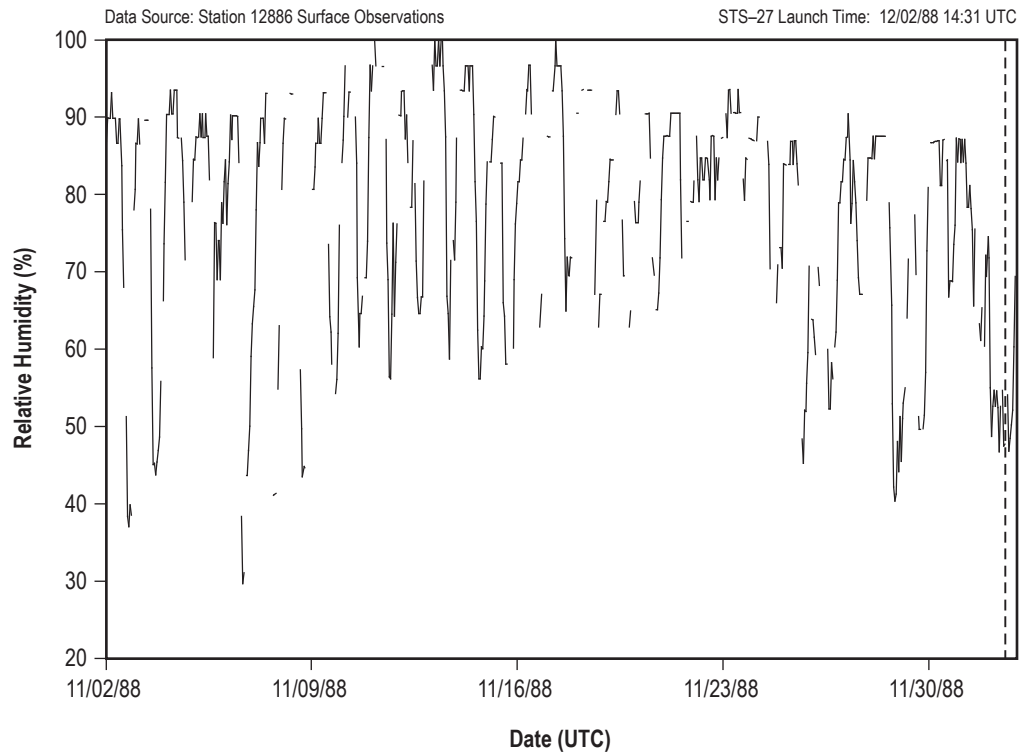


Figure 164. STS-27 hourly surface relative humidity.

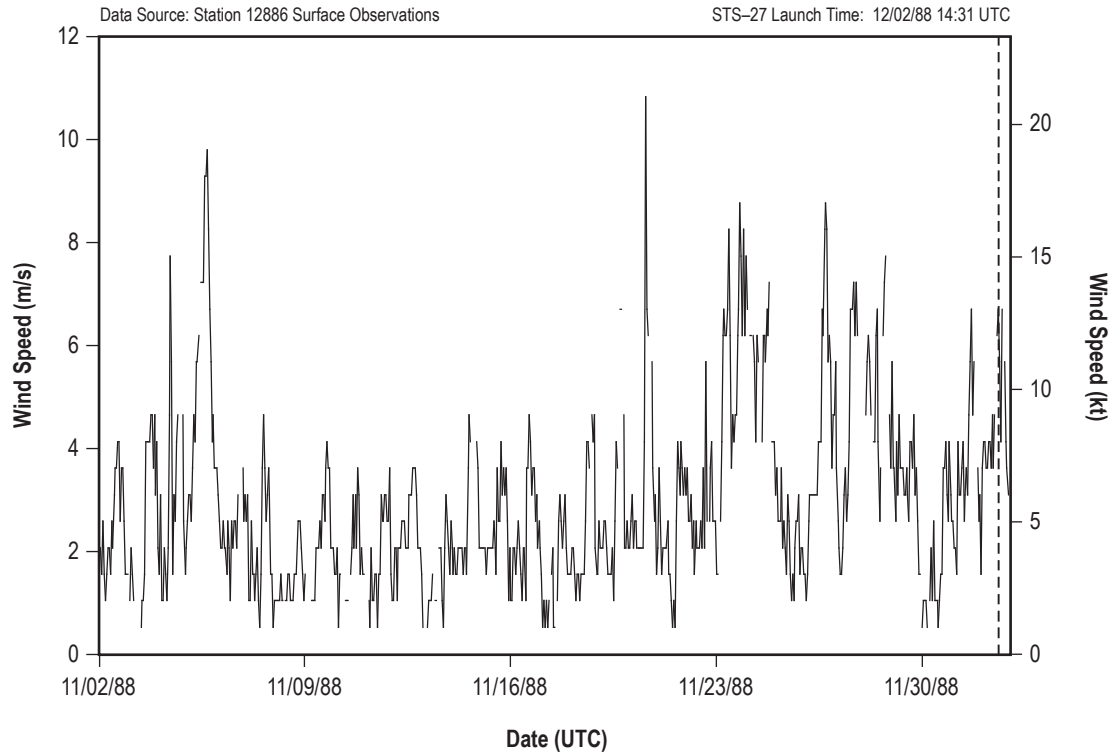


Figure 165. STS-27 hourly surface wind speed.

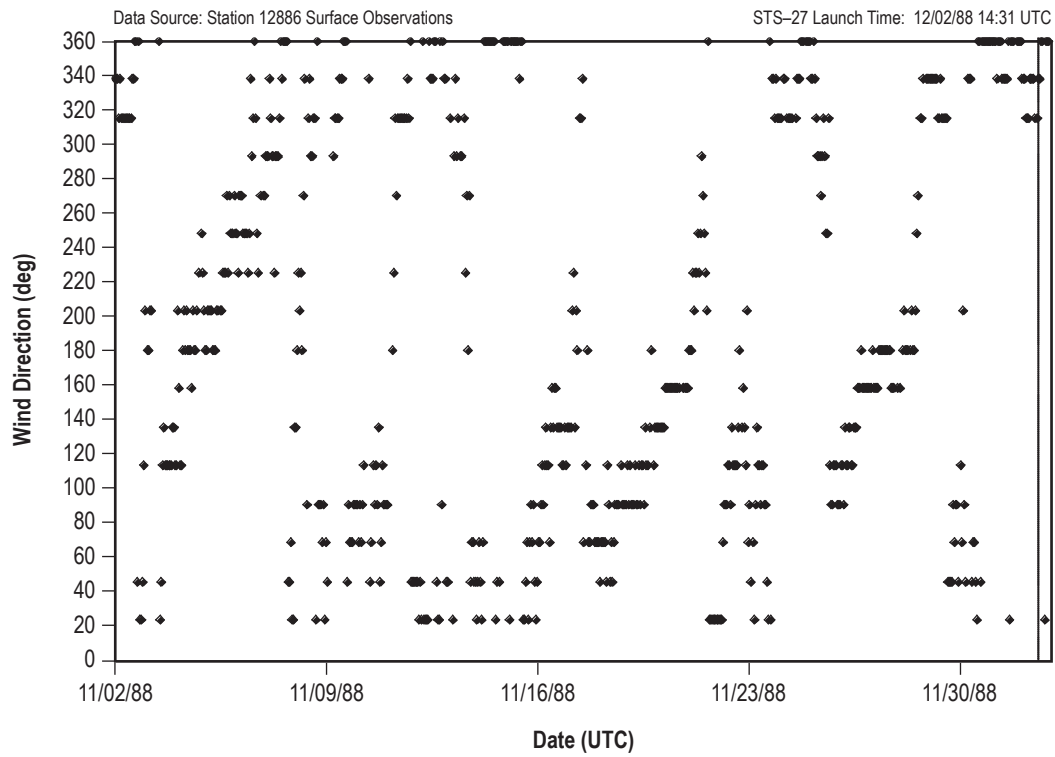


Figure 166. STS-27 hourly surface wind direction.

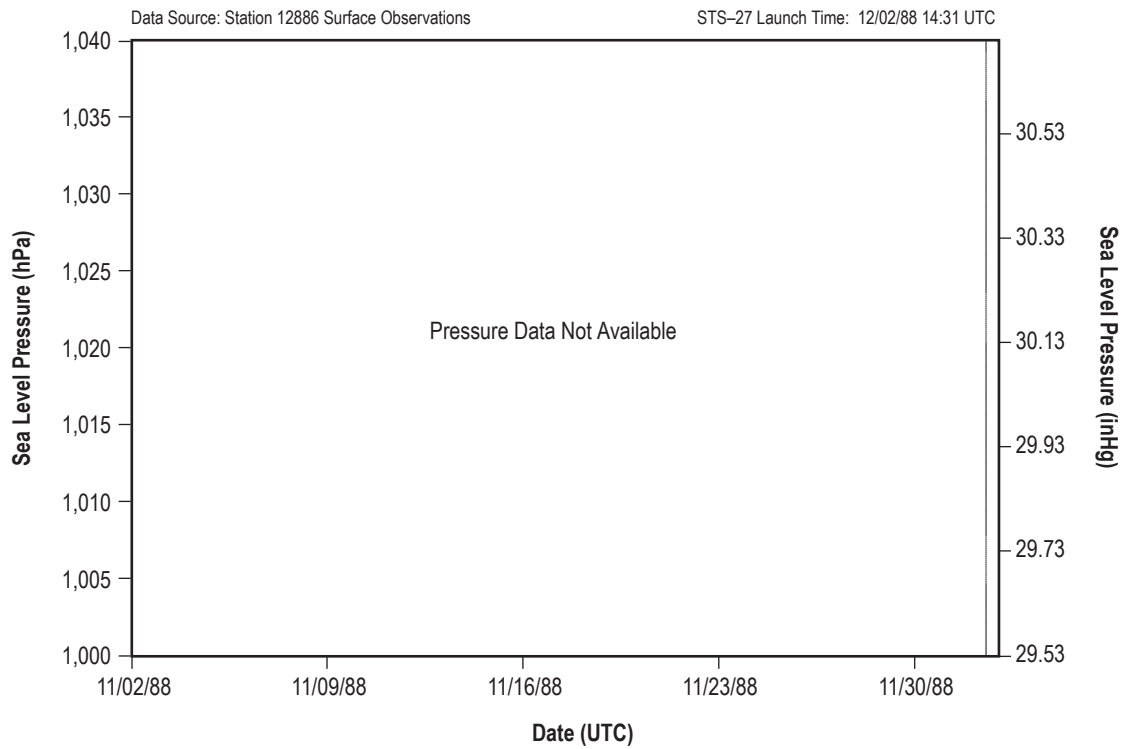


Figure 167. STS-27 hourly sea level pressure.

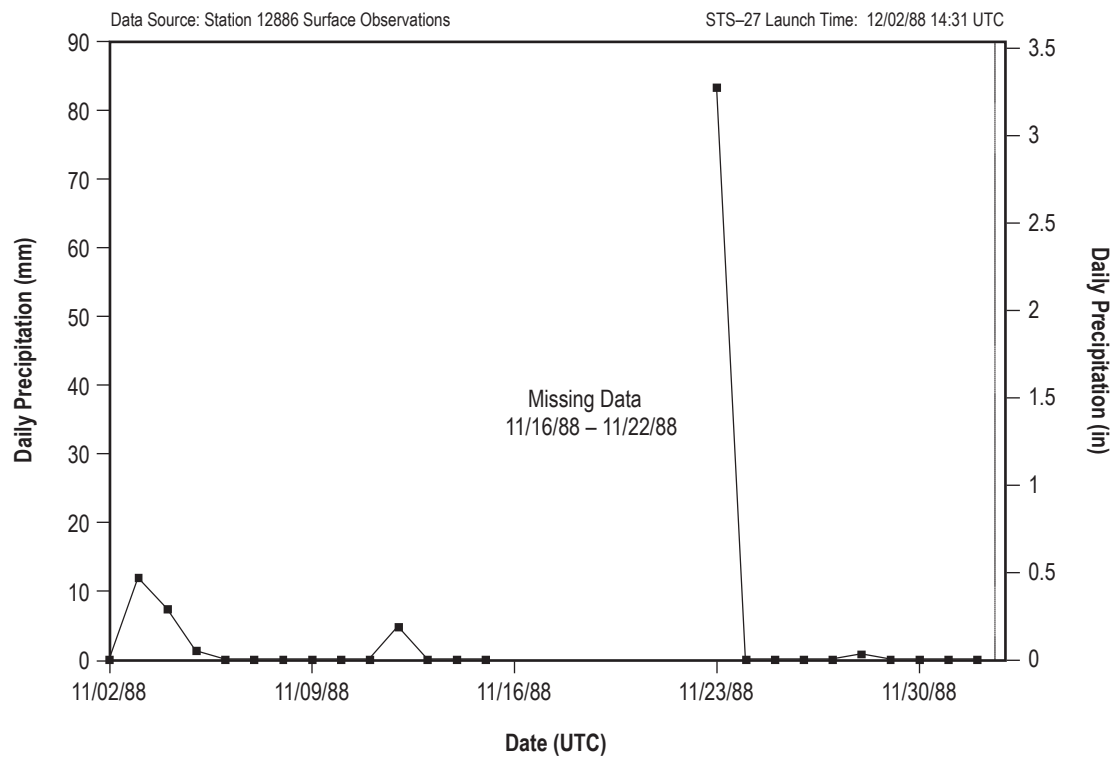


Figure 168. STS-27 daily precipitation totals.

## 5.28 STS–29

STS–29 was the eighth mission for *Discovery* (OV–103). It rolled out to pad 39B on February 3, 1989. STS–29 was exposed on the pad for 39 days and launched on March 13, 1989, at 14:57 UTC.

### 5.28.1 STS–29 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–29.

### 5.28.2 STS–29 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–29 are shown in table 59. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 59.

Table 59. STS–29 L–0 surface observations.

Temperature	17.8 °C (64 °F)
Relative humidity	78%
Sea level pressure	1,019.3 hPa (30.1 inHg)
Wind speed	5.2 m/s (10 kt)
Wind direction	242°
Sky condition	Clear skies
Visibility	13 km (7 nmi)

### 5.28.3 STS–29 Pad Exposure Period Surface Meteorological Parameters

Figures 169–174 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–29 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 60. All data in this section were collected at station 12886.

Table 60. STS–29 pad exposure period hourly extremes.

Minimum temperature	0 °C (32 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	19%
Maximum relative humidity	97%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	11.3 m/s (22 kt) 338°
Total precipitation	85.8 mm (3.38 in)

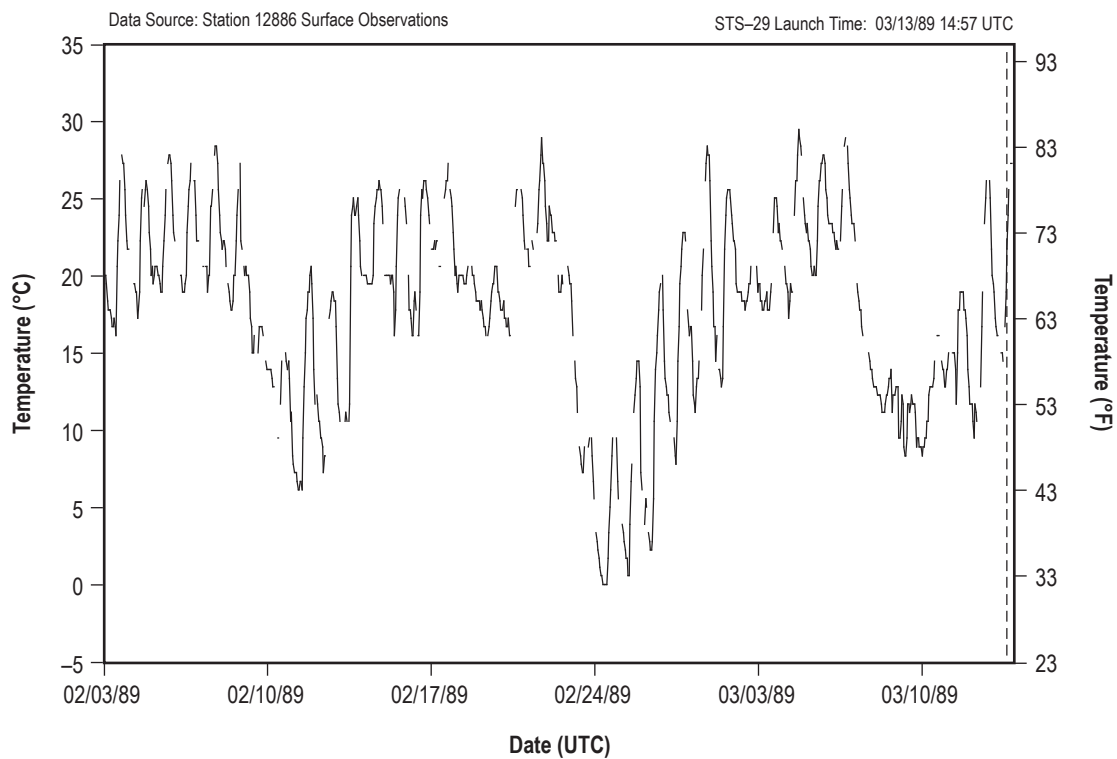


Figure 169. STS-29 hourly surface temperature.

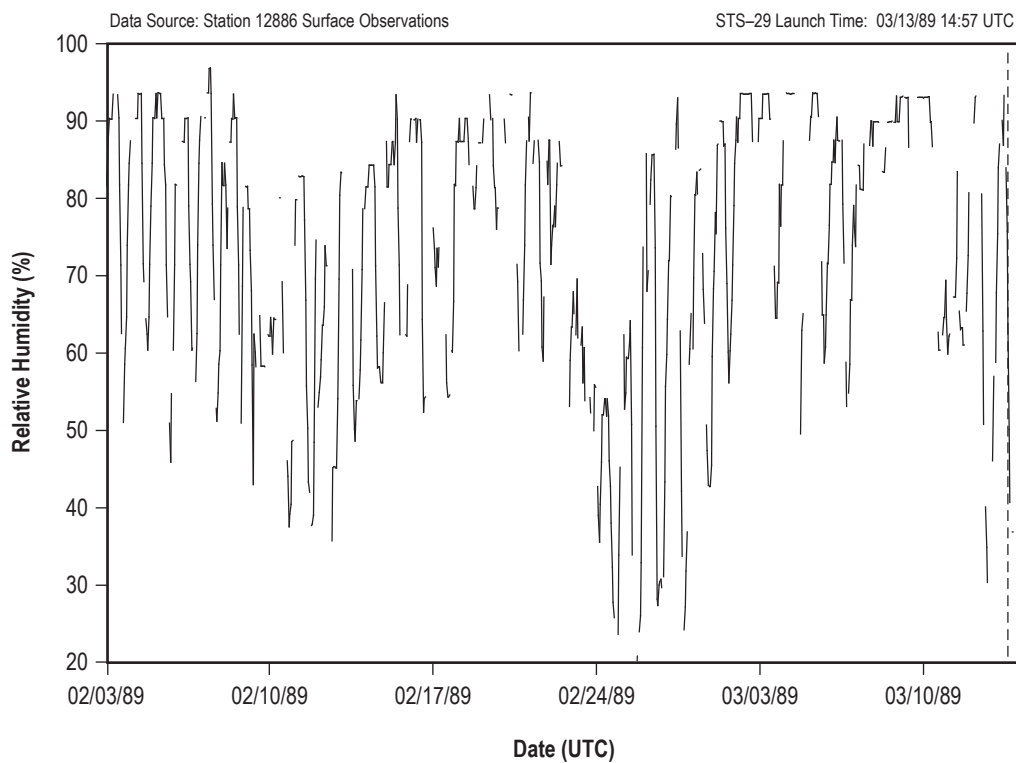


Figure 170. STS-29 hourly surface relative humidity.

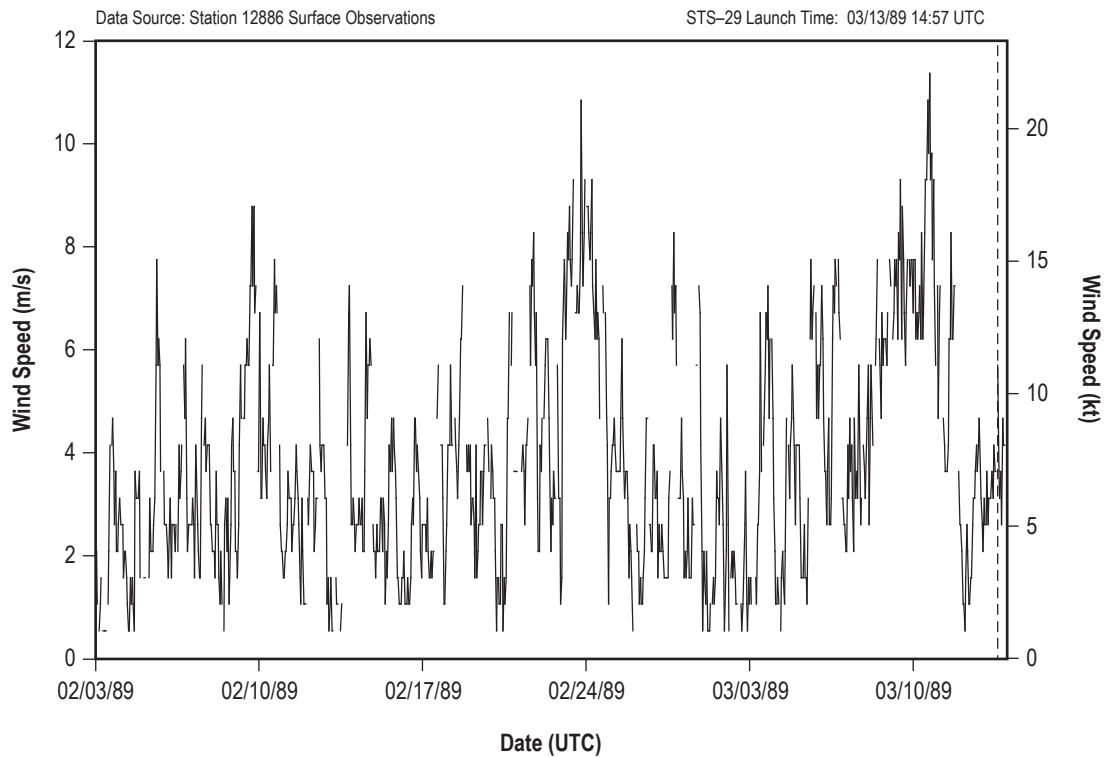


Figure 171. STS-29 hourly surface wind speed.

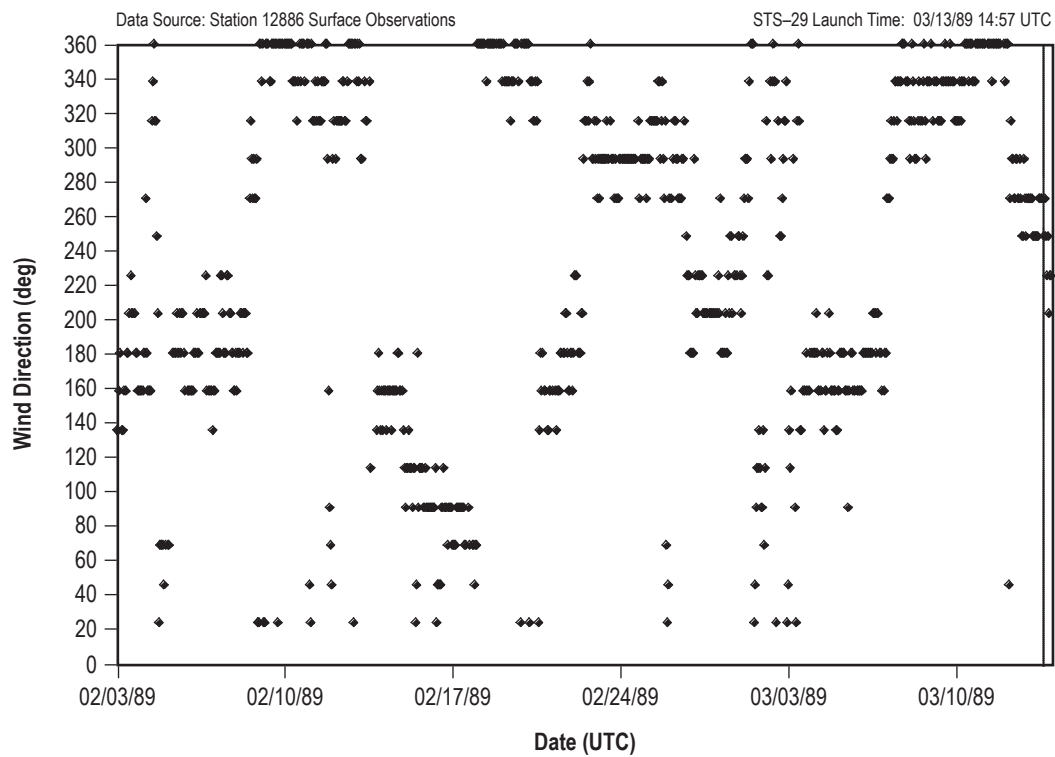


Figure 172. STS-29 hourly surface wind direction.



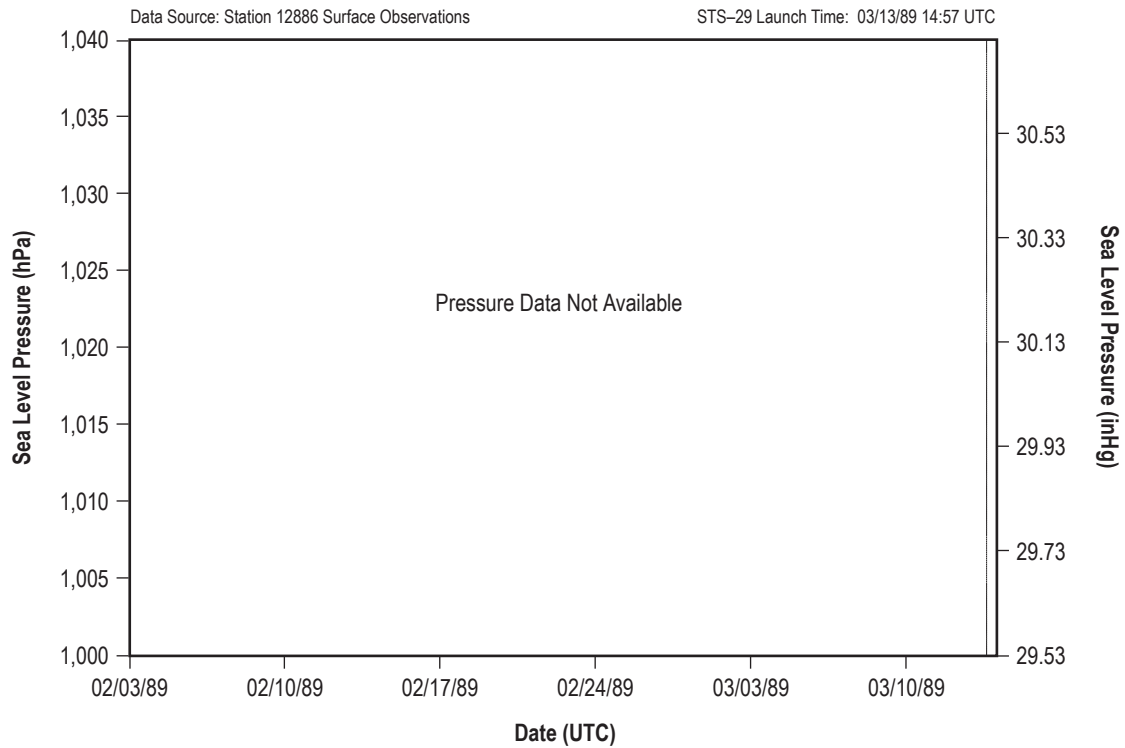


Figure 173. STS-29 hourly sea level pressure.

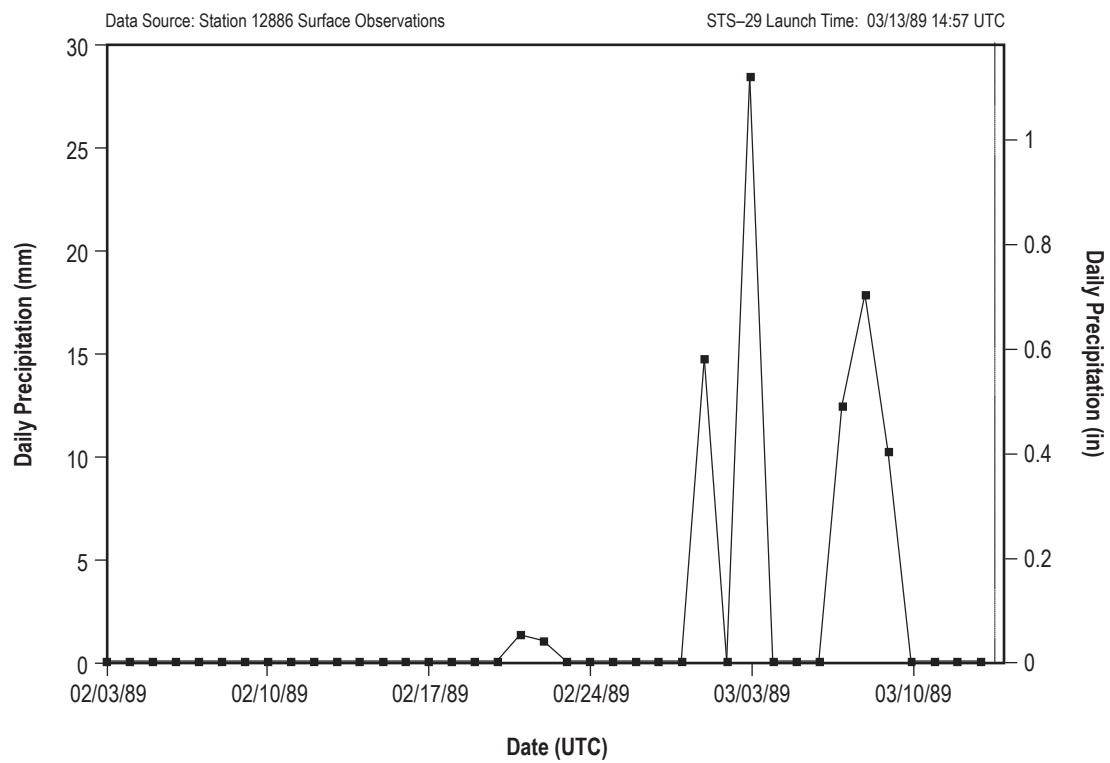


Figure 174. STS-29 daily precipitation totals.

## 5.29 STS-30

STS-30 was the fourth mission for *Atlantis* (OV-104). It rolled out to pad 39B on March 22, 1989. STS-30 was exposed on the pad for 44 days and launched on May 4, 1989, at 18:47 UTC.

### 5.29.1 STS-30 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS-30.

### 5.29.2 STS-30 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-30 are shown in table 61. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 61.

Table 61. STS-30 L-0 surface observations.

Temperature	26.1 °C (79 °F)
Relative humidity	57%
Sea level pressure	1,020 hPa (30.12 inHg)
Wind speed	6.6 m/s (12.8 kt) (5-min average)
Wind direction	106° (5-min average)
Sky condition	1/8 cumulus at 1,158 m (3,800 ft); 3/8 stratocumulus at 1,524 m (5,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.29.3 STS-30 Pad Exposure Period Surface Meteorological Parameters

Figures 175–180 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-30 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 62. All data in this section were collected at station 12886.

Table 62. STS-30 pad exposure period hourly extremes.

Minimum temperature	10.6 °C (51 °F)
Maximum temperature	32.8 °C (91 °F)
Minimum relative humidity	24%
Maximum relative humidity	100%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	9.3 m/s (18 kt) 158°
Total precipitation	70.4 mm (2.77 in)

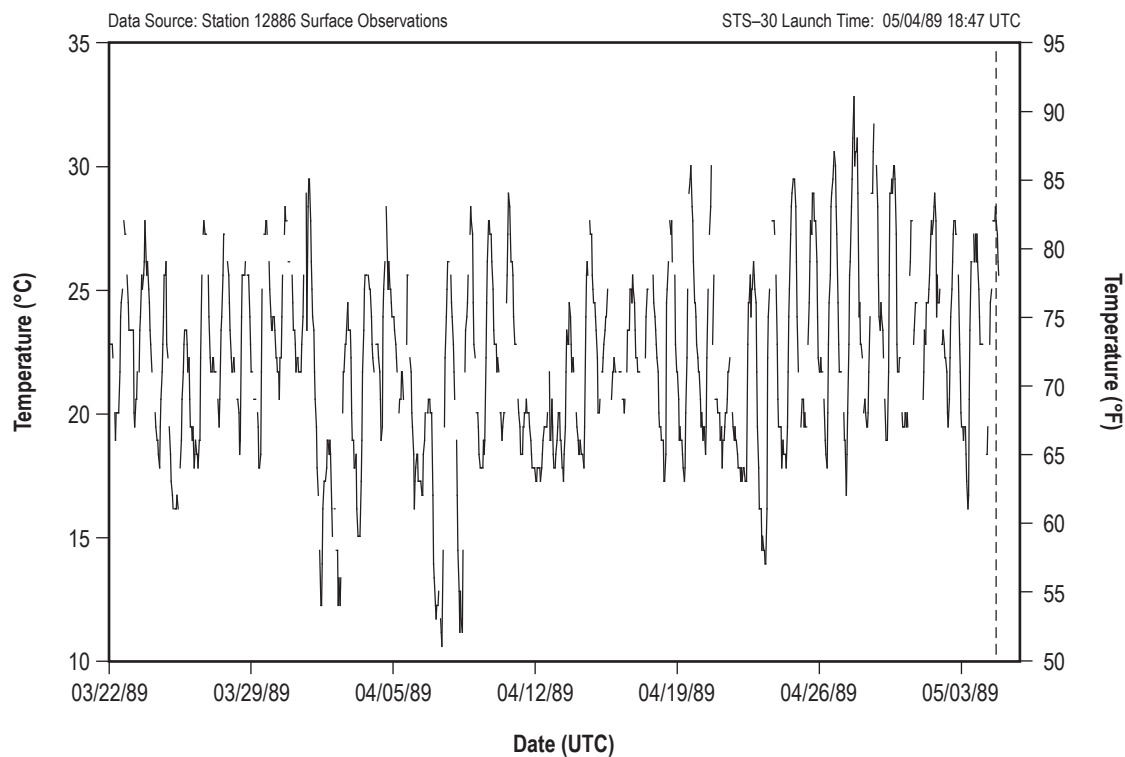


Figure 175. STS-30 hourly surface temperature.

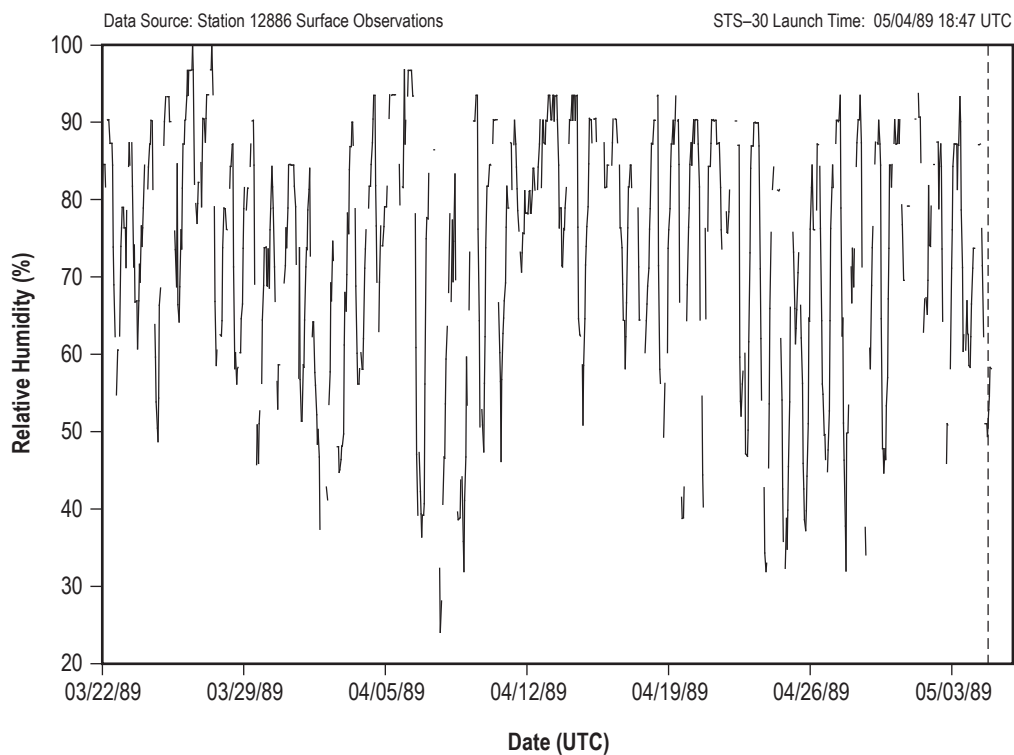


Figure 176. STS-30 hourly surface relative humidity.

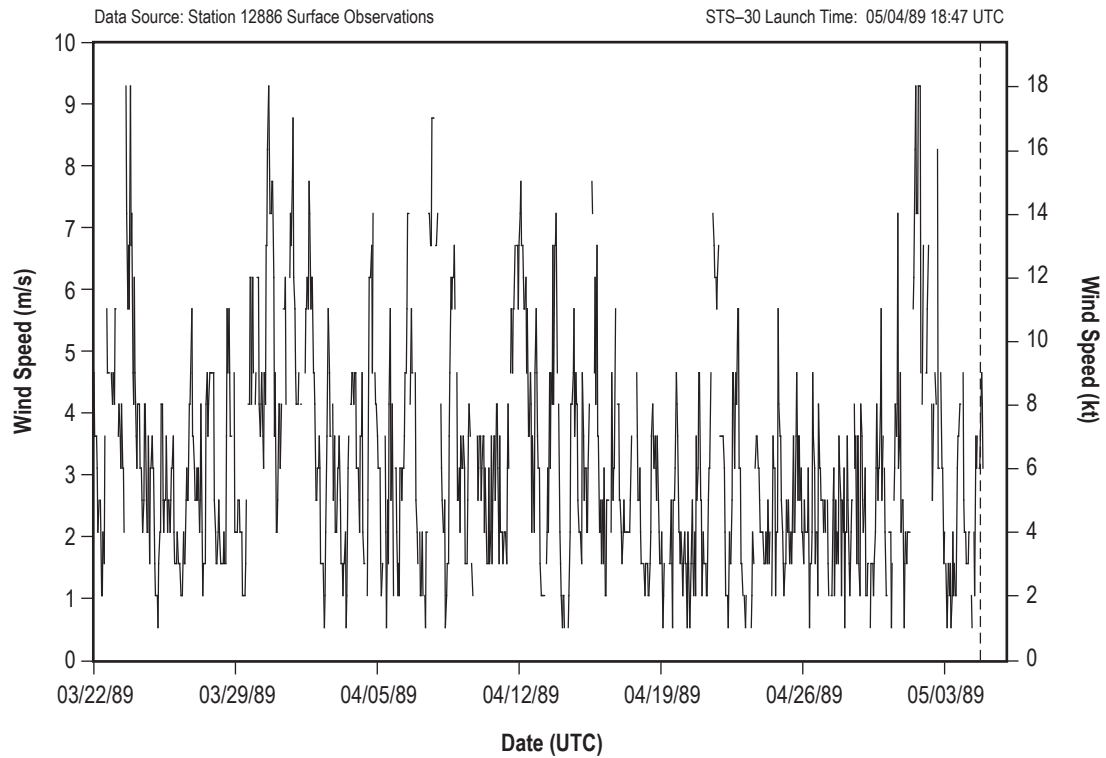


Figure 177. STS-30 hourly surface wind speed.

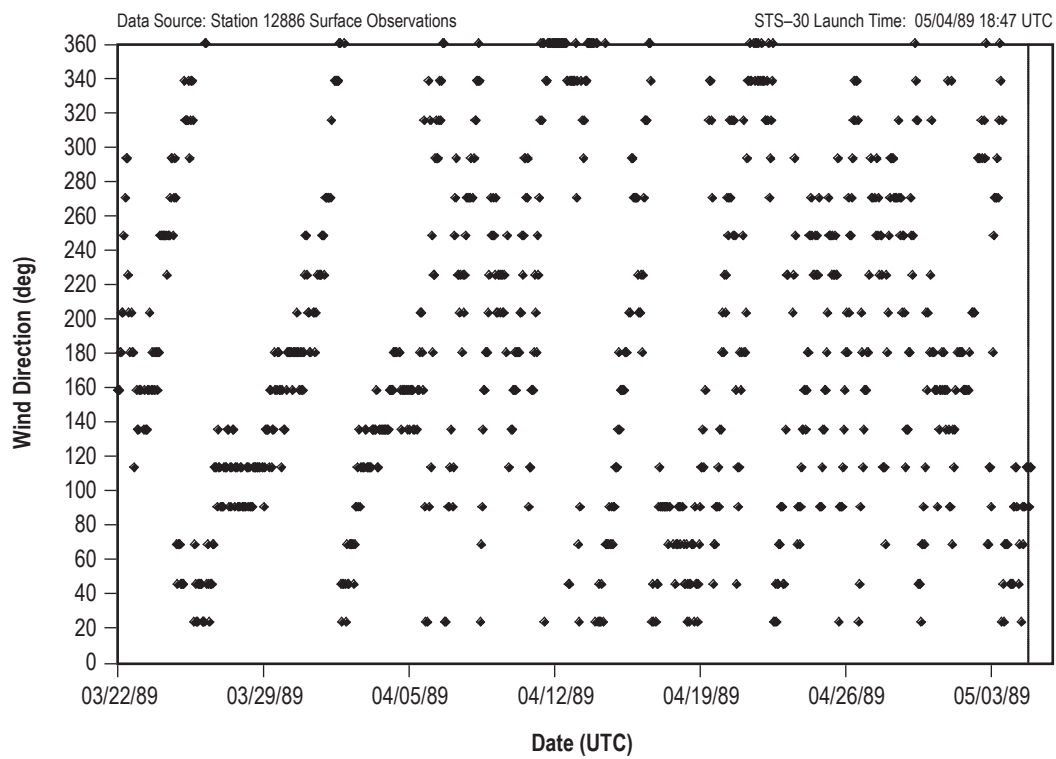


Figure 178. STS-30 hourly surface wind direction.

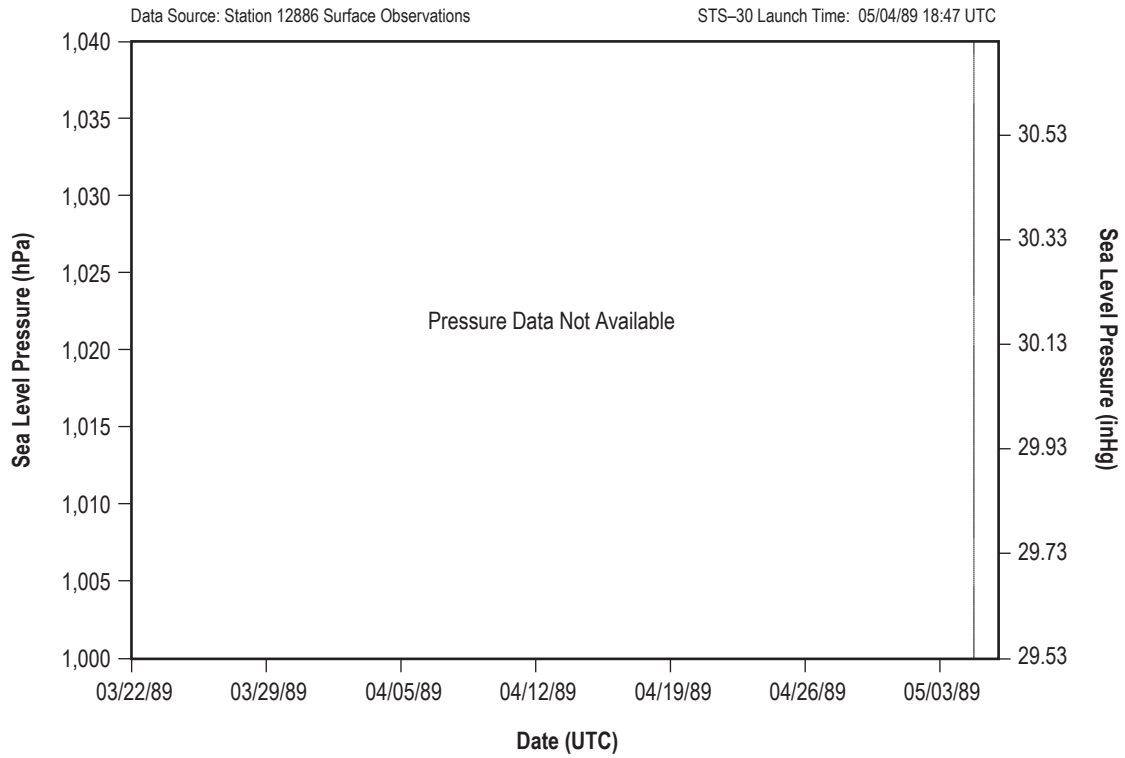


Figure 179. STS-30 hourly sea level pressure.

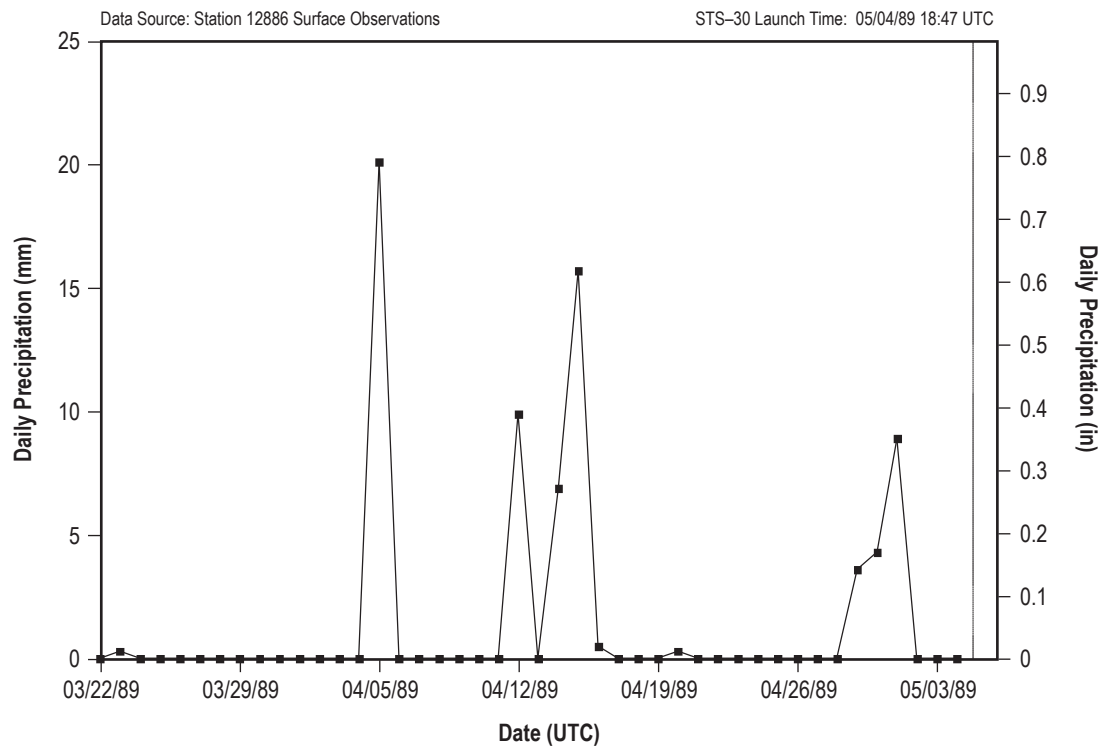


Figure 180. STS-30 daily precipitation totals.

## 5.30 STS–28

STS–28 was the eighth mission for *Columbia* (OV–102). It rolled out to pad 39B on July 14, 1989. STS–28 was exposed on the pad for 26 days and launched on August 8, 1989, at 12:37 UTC.

### 5.30.1 STS–28 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–28.

### 5.30.2 STS–28 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–28 are shown in table 63. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 63.

Table 63. STS–28 L–0 surface observations.

Temperature	26.7 °C (80 °F)
Relative humidity	80%
Sea level pressure	1,011.9 hPa (29.88 inHg)
Wind speed	3.8 m/s (7.4 kt) (5-min average)
Wind direction	252° (5-min average)
Sky condition	1/8 cirrus at 9,144 m (30,000 ft);
Visibility	8 km (4.3 nmi)

### 5.30.3 STS–28 Pad Exposure Period Surface Meteorological Parameters

Figures 181–186 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–28 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 64. All data in this section were collected at station 12886.

Table 64. STS–28 pad exposure period hourly extremes.

Minimum temperature	21.7 °C (71 °F)
Maximum temperature	35.6 °C (96 °F)
Minimum relative humidity	40%
Maximum relative humidity	97%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	7.7 m/s (15 kt) 315°
Total precipitation	109.7 mm (4.32 in)

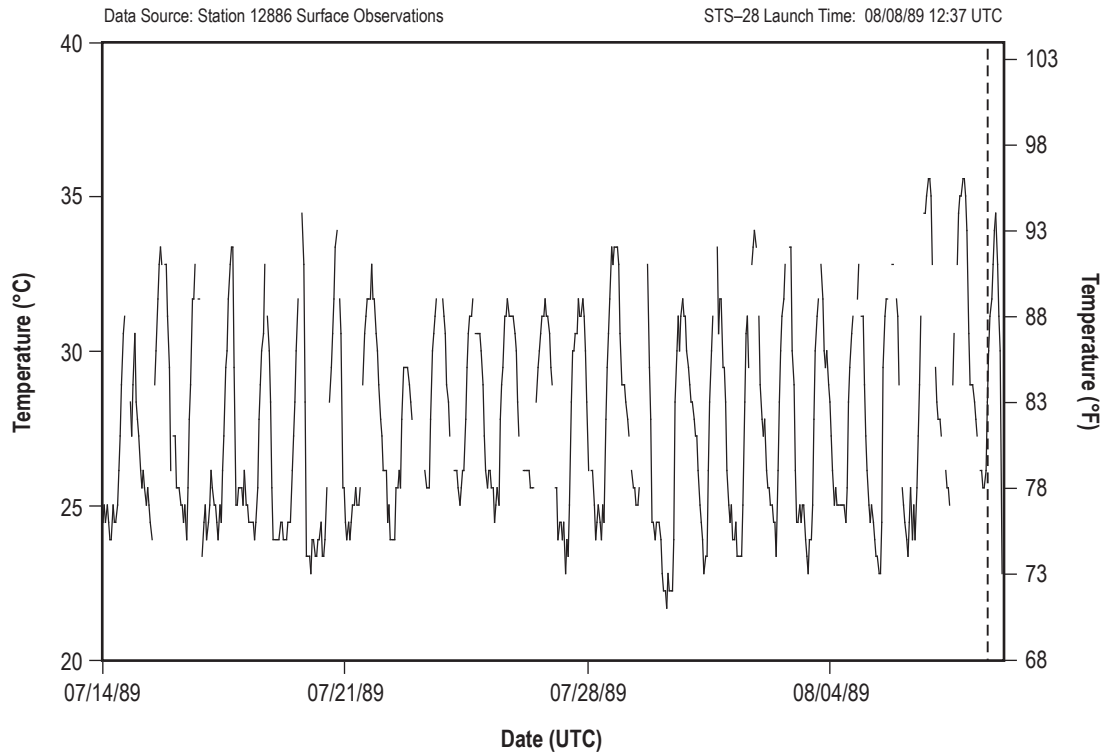


Figure 181. STS-28 hourly surface temperature.

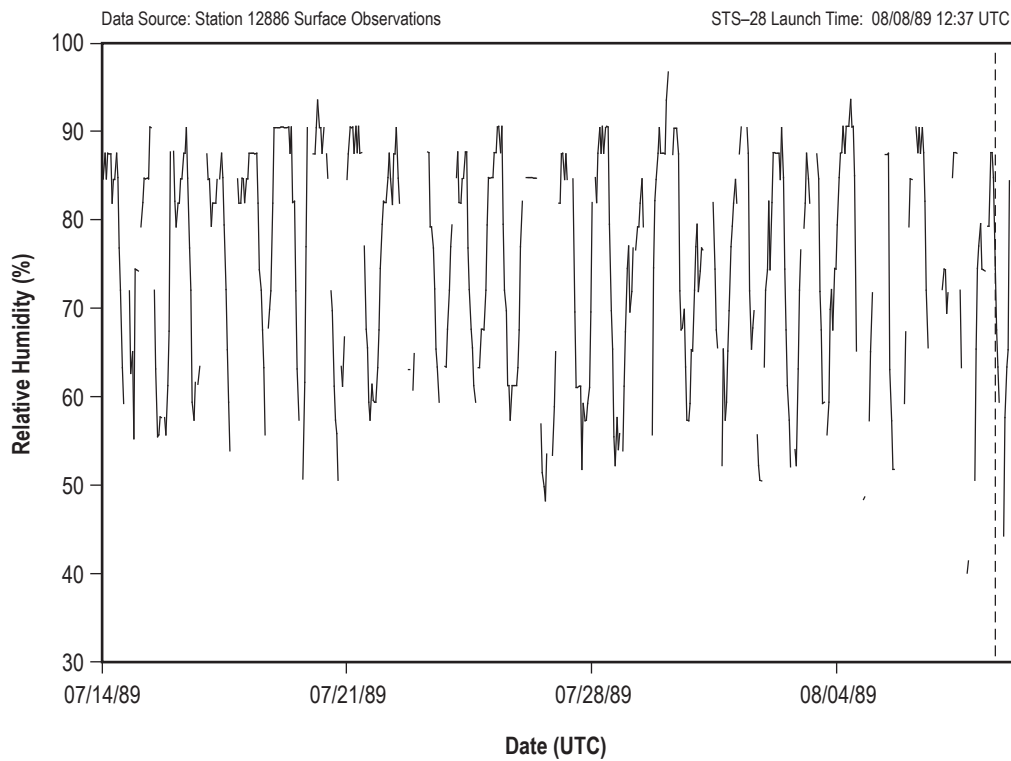


Figure 182. STS-28 hourly surface relative humidity.

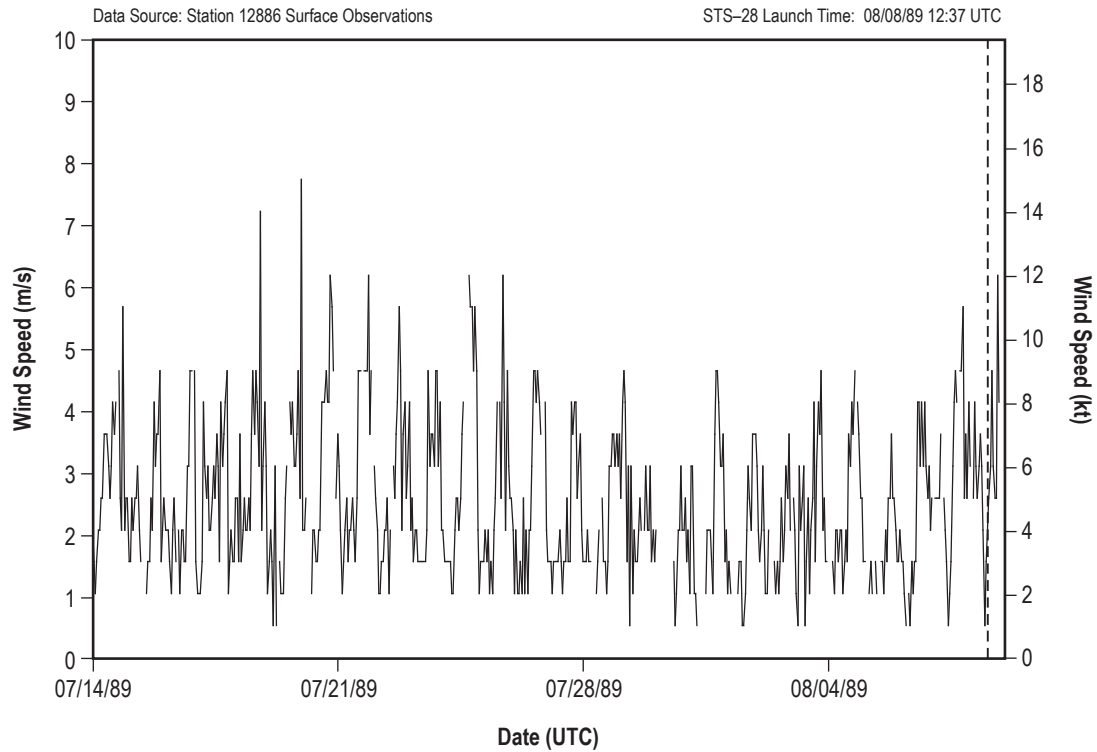


Figure 183. STS-28 hourly surface wind speed.

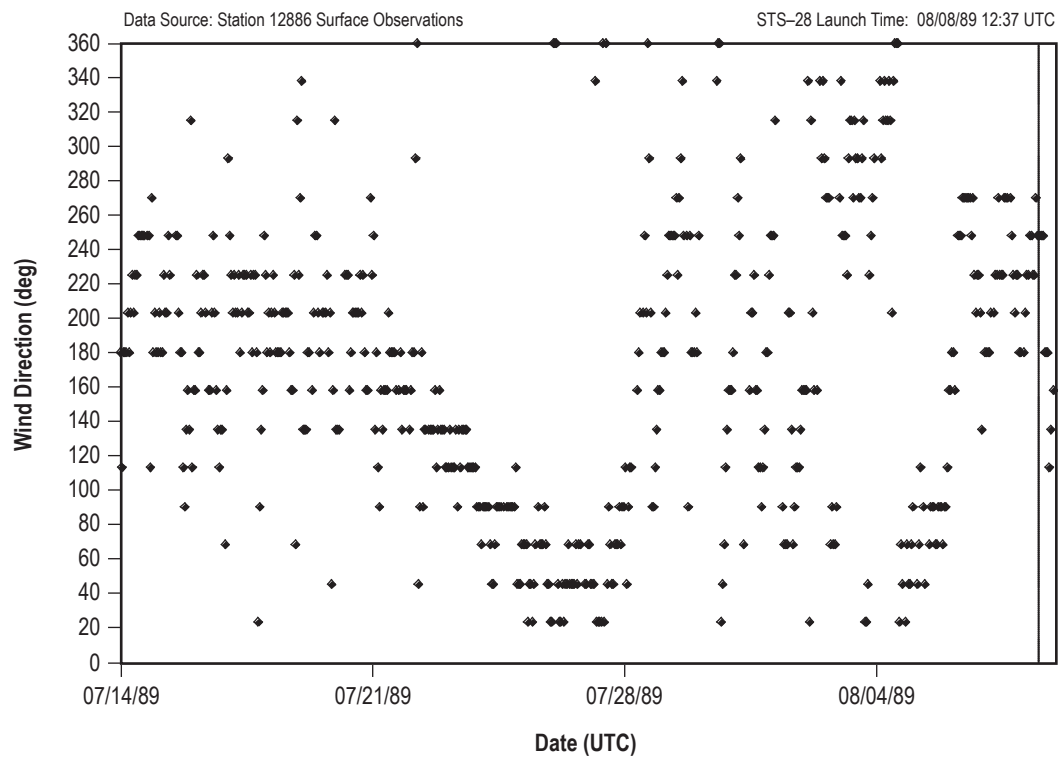


Figure 184. STS-28 hourly surface wind direction.



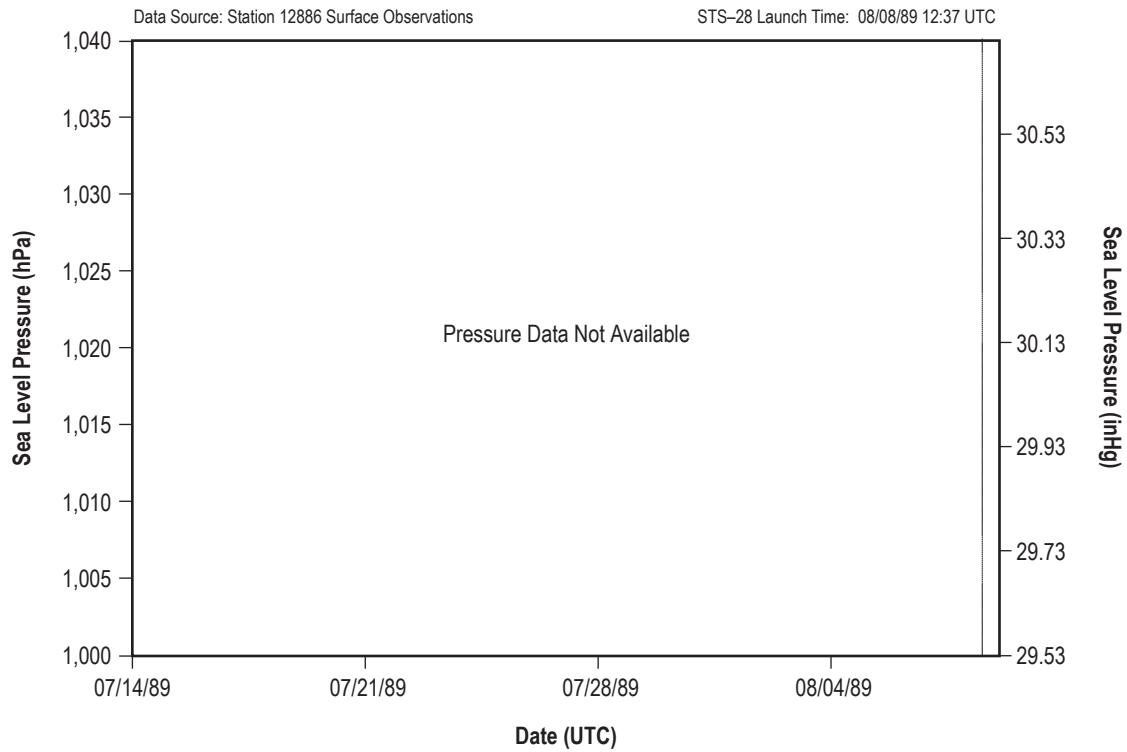


Figure 185. STS-28 hourly sea level pressure.

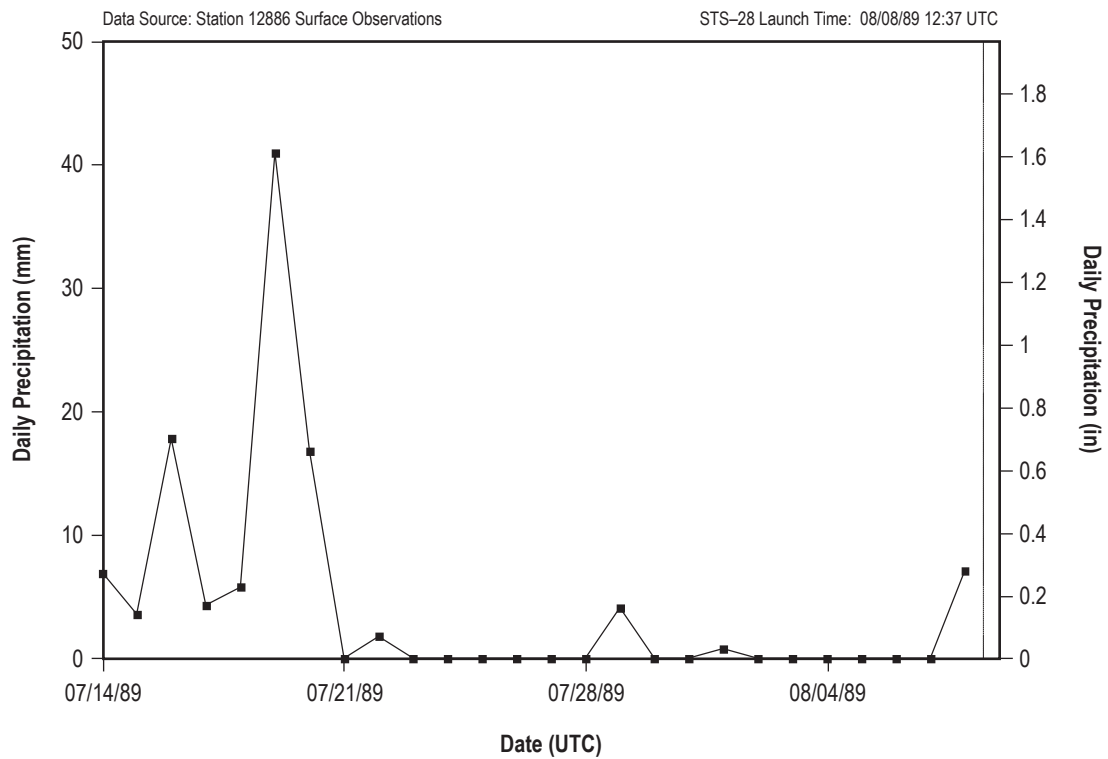


Figure 186. STS-28 daily precipitation totals.

## 5.31 STS–34

STS–34 was the fifth mission for *Atlantis* (OV–104). It rolled out to pad 39B on August 29, 1989. STS–34 was exposed on the pad for 51 days and launched on October 18, 1989, at 16:54 UTC.

### 5.31.1 STS–34 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–34.

### 5.31.2 STS–34 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–34 are shown in table 65. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 65.

Table 65. STS–34 L–0 surface observations.

Temperature	30 °C (86 °F)
Relative humidity	52%
Sea level pressure	1,015.2 hPa (29.98 inHg)
Wind speed	4.1 m/s (8 kt) (1-min average)
Wind direction	193° (1-min average)
Sky condition	2/8 cumulus at 914 m (3,000 ft); 1/8 stratocumulus at 1,524 m (5,000 ft); 1/8 cirrostratus at 8,534 m (28,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.31.3 STS–34 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 187–192 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS–34 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 66. All data in this section were collected at station 12886.

Table 66. STS–34 pad exposure period hourly extremes.

Minimum temperature	18.9 °C (66 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	40%
Maximum relative humidity	94%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	9.3 m/s (18 kt) 338°
Total precipitation	352.6 mm (13.88 in)

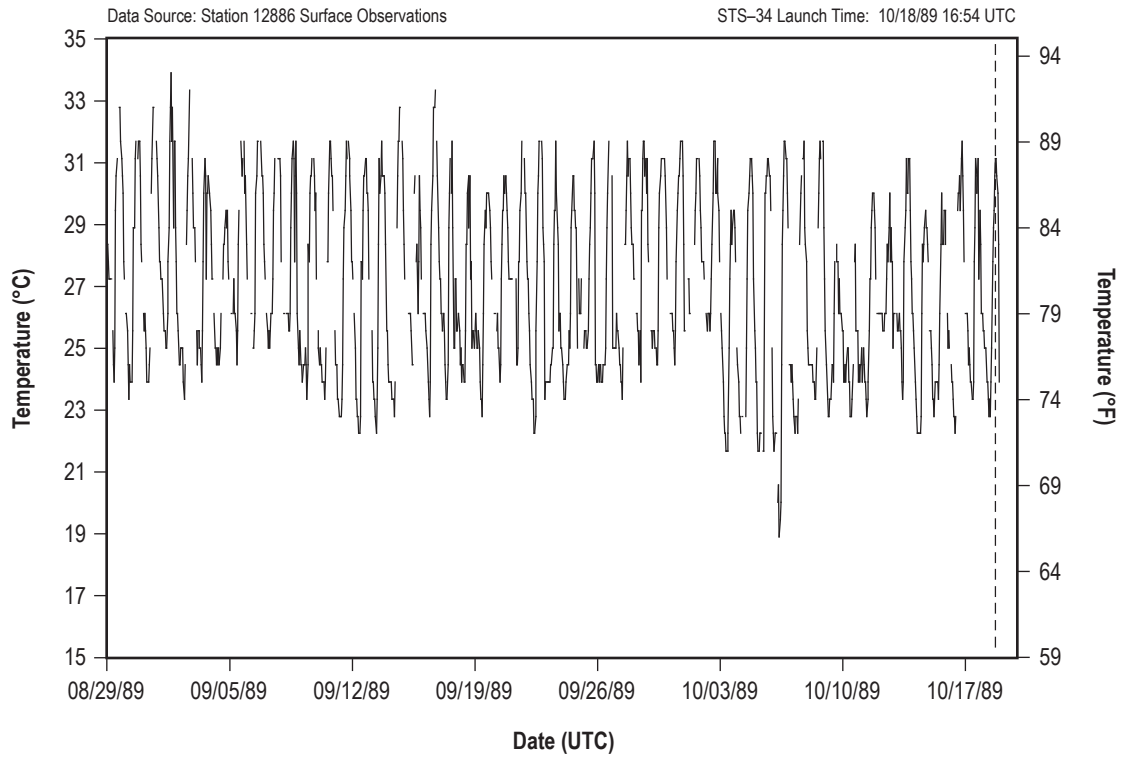


Figure 187. STS-34 hourly surface temperature.

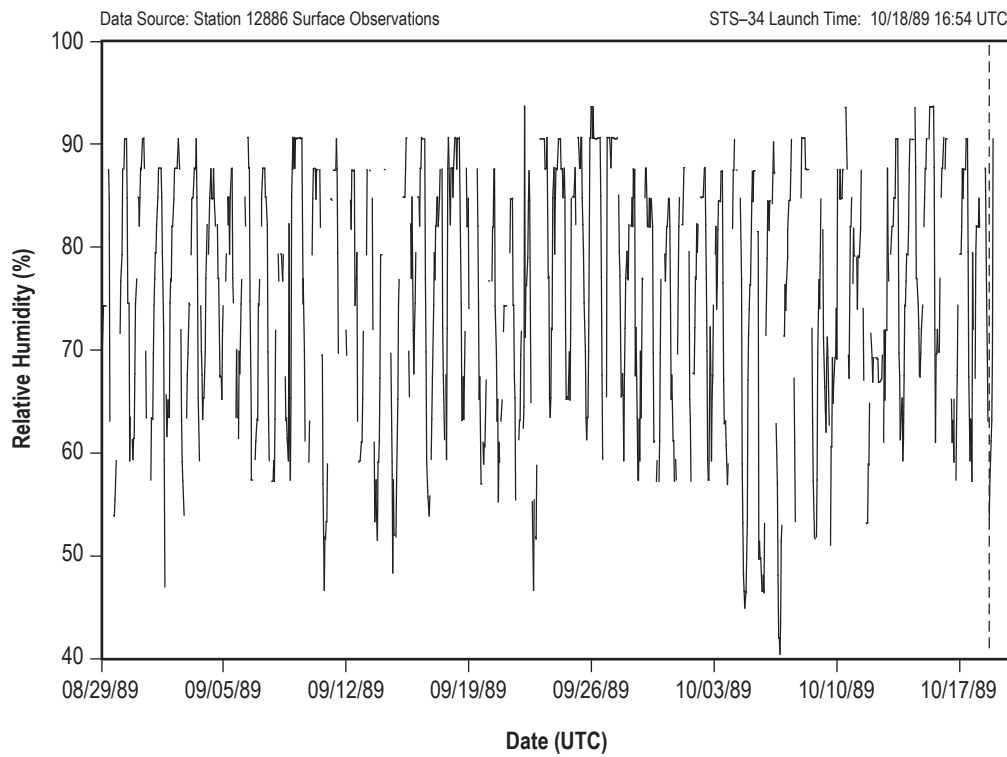


Figure 188. STS-34 hourly surface relative humidity.

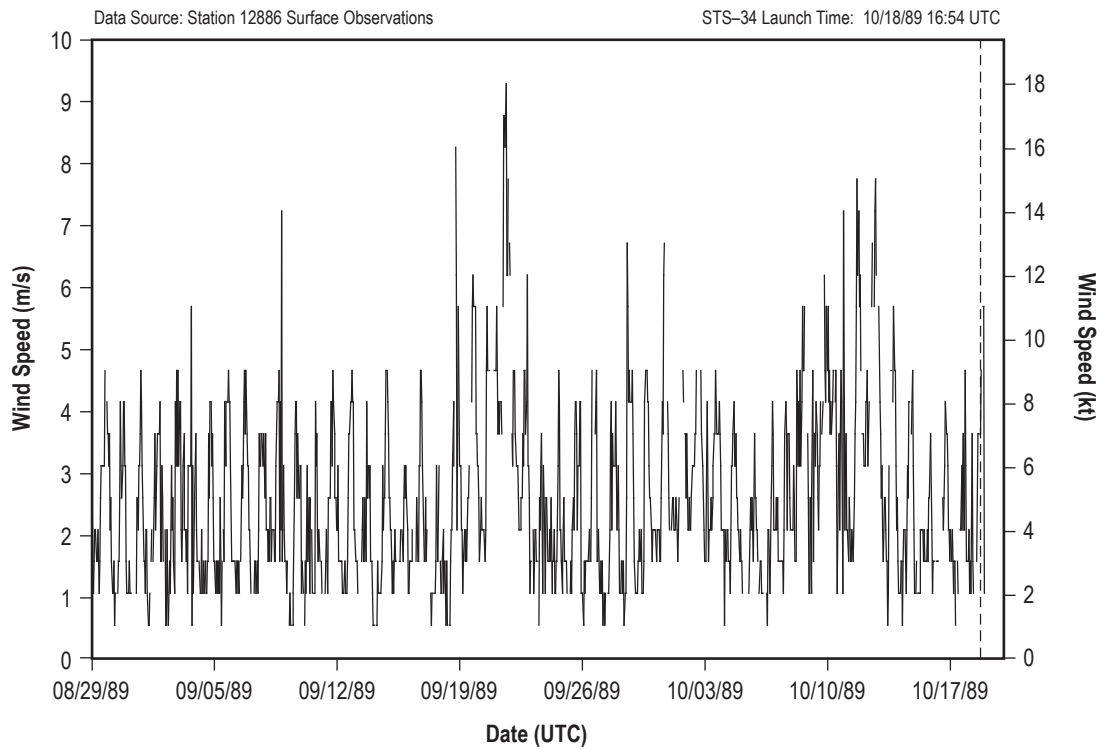


Figure 189. STS-34 hourly surface wind speed.

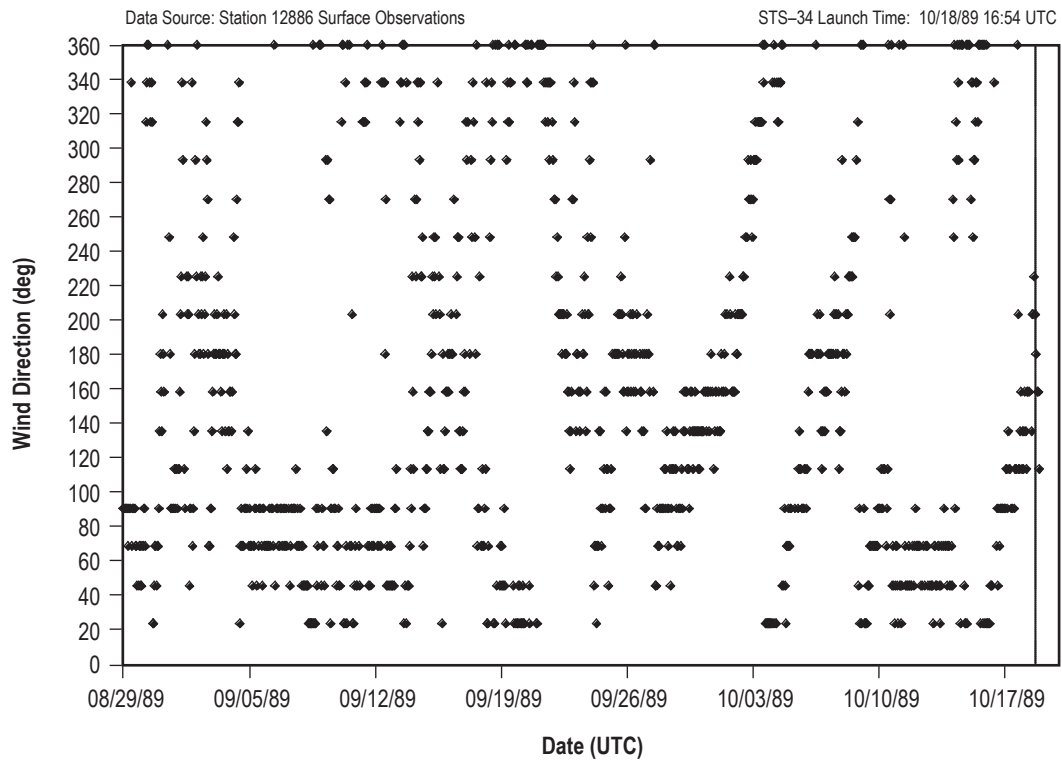


Figure 190. STS-34 hourly surface wind direction.

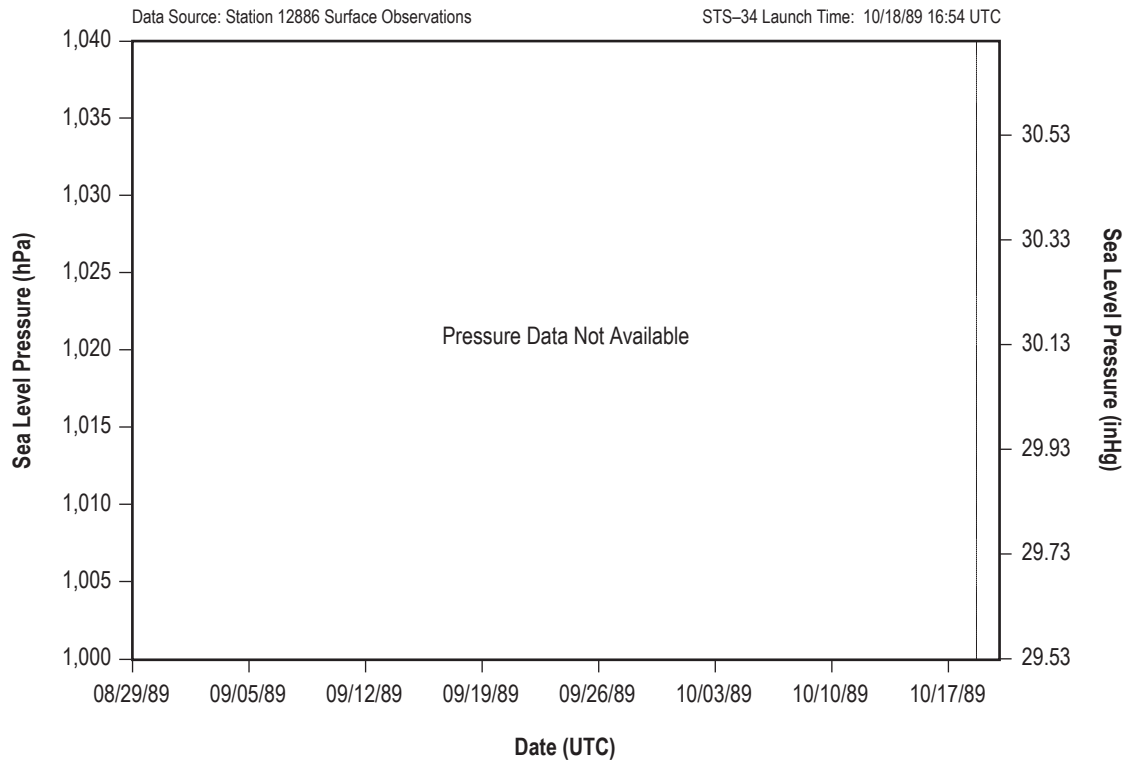


Figure 191. STS-34 hourly sea level pressure.

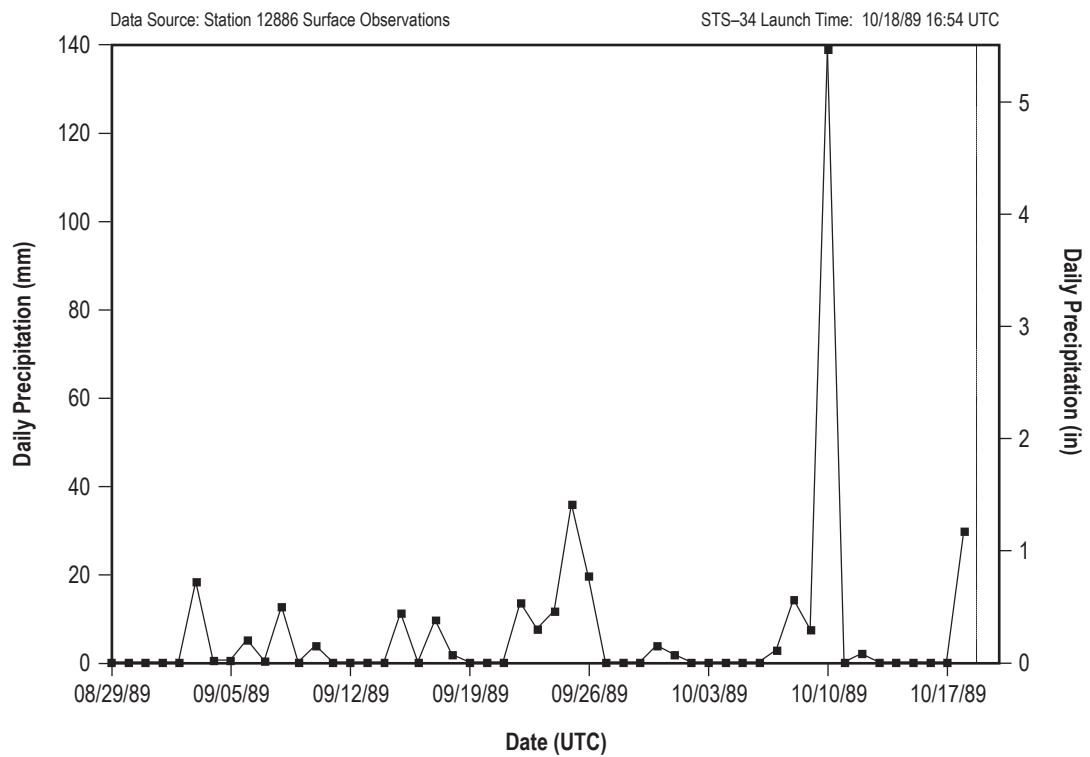


Figure 192. STS-34 daily precipitation totals.

## 5.32 STS–33

STS–33 was the ninth mission for *Discovery* (OV–103). It rolled out to pad 39B on October 27, 1989. STS–33 was exposed on the pad for 28 days and launched on November 23, 1989, at 00:23 UTC.

### 5.32.1 STS–33 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–33.

### 5.32.2 STS–33 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–33 are shown in table 67. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 67. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 67. STS–33 L–0 surface observations.

Temperature	18.9 °C (66 °F)
Relative humidity	80%
Sea level pressure	1,013.2 hPa (29.92 inHg)
Wind speed	5.2 m/s (10 kt) (1-min average)
Wind direction	208° (1-min average)
Sky condition	Clear skies
Visibility	13 km (7 nmi)

### 5.32.3 STS–33 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 193–198 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS–33 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 68. All data in this section were collected at station 12886.

Table 68. STS–33 pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	34%
Maximum relative humidity	97%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 23°
Total precipitation	71.4 mm (2.81 in)

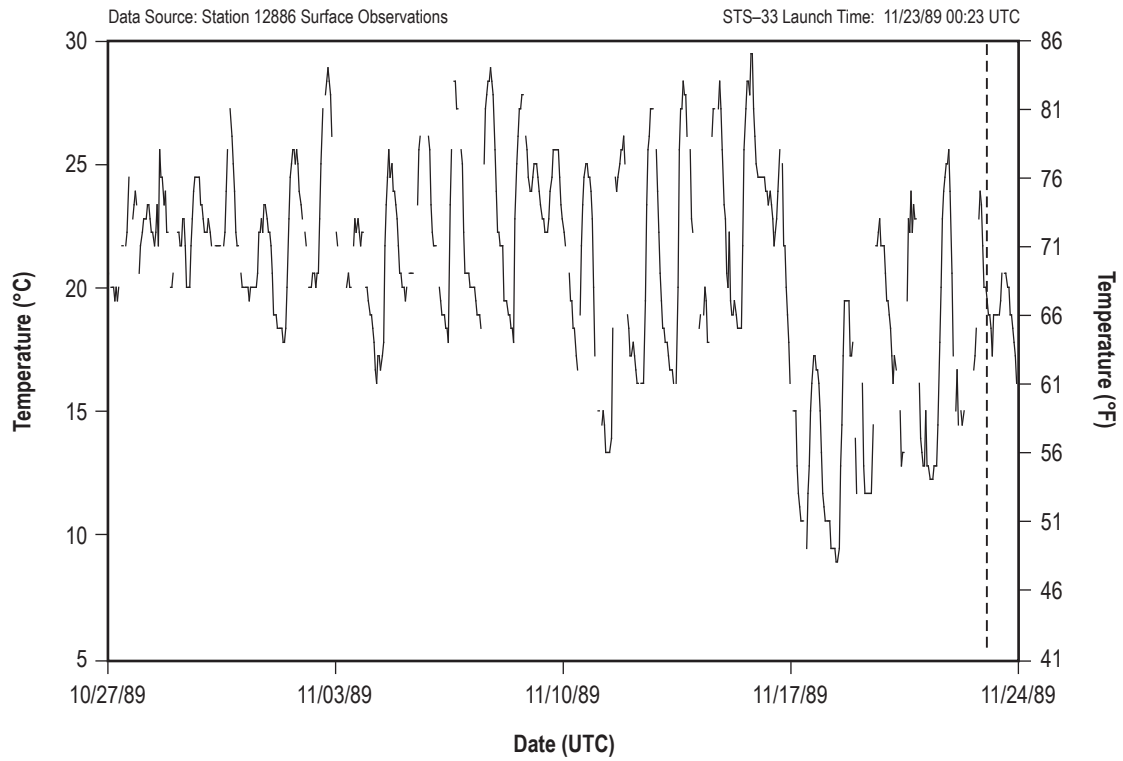


Figure 193. STS-33 hourly surface temperature.

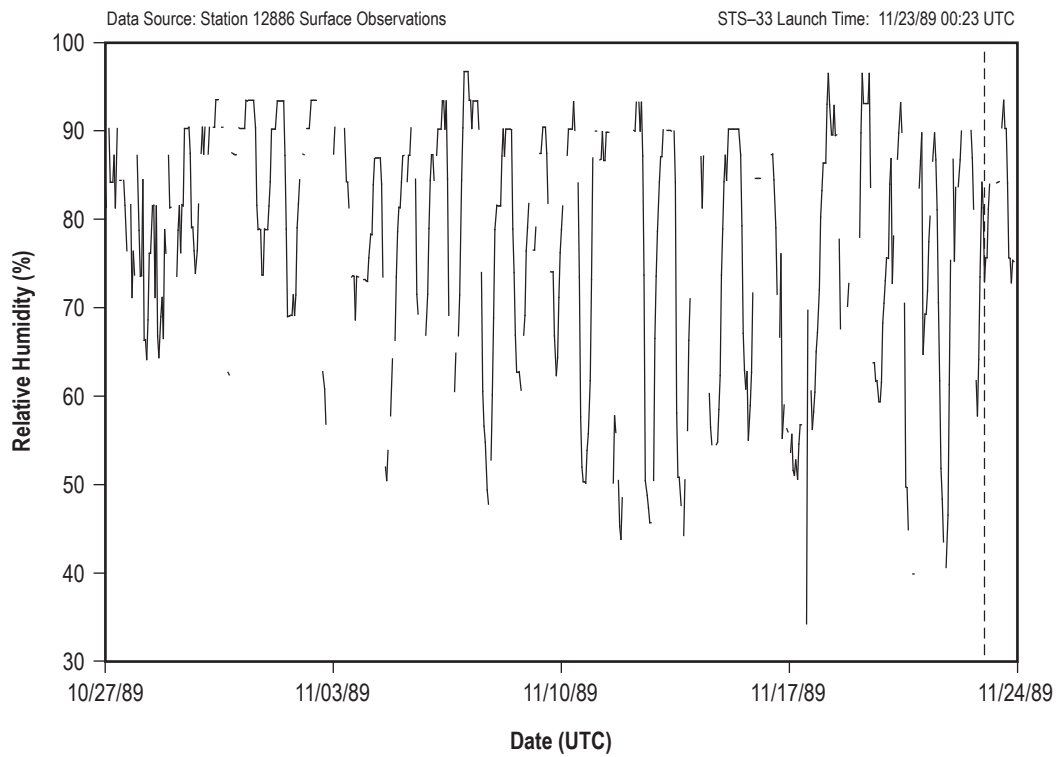


Figure 194. STS-33 hourly surface relative humidity.

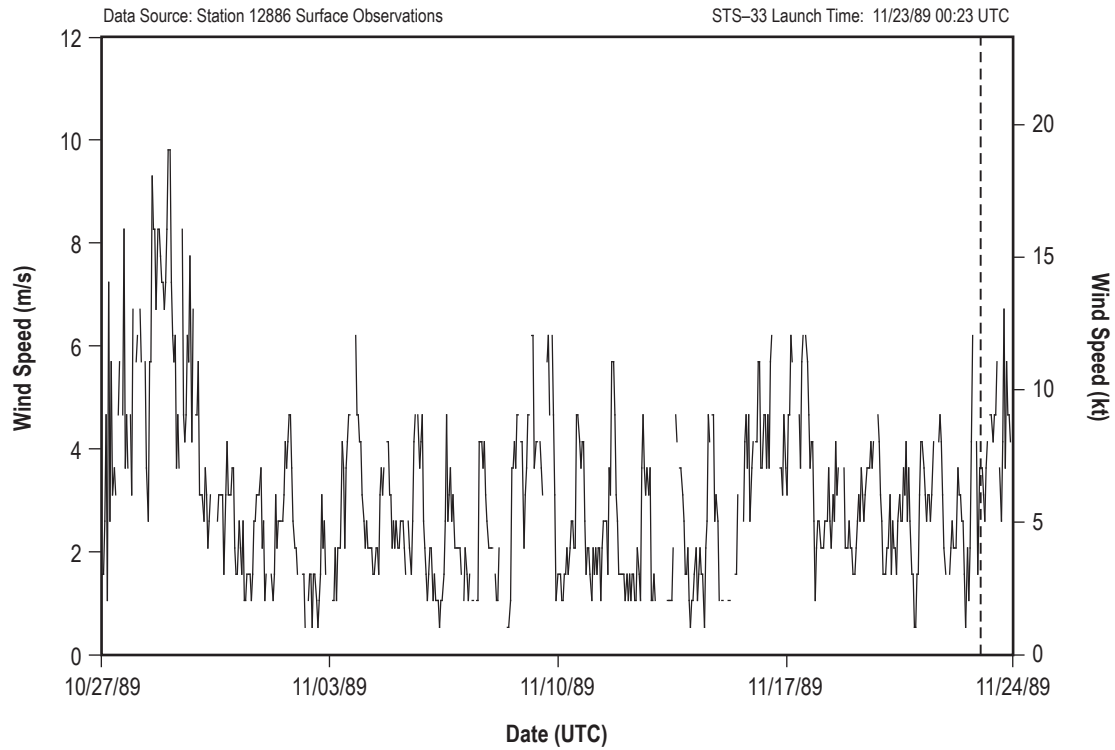


Figure 195. STS-33 hourly surface wind speed.

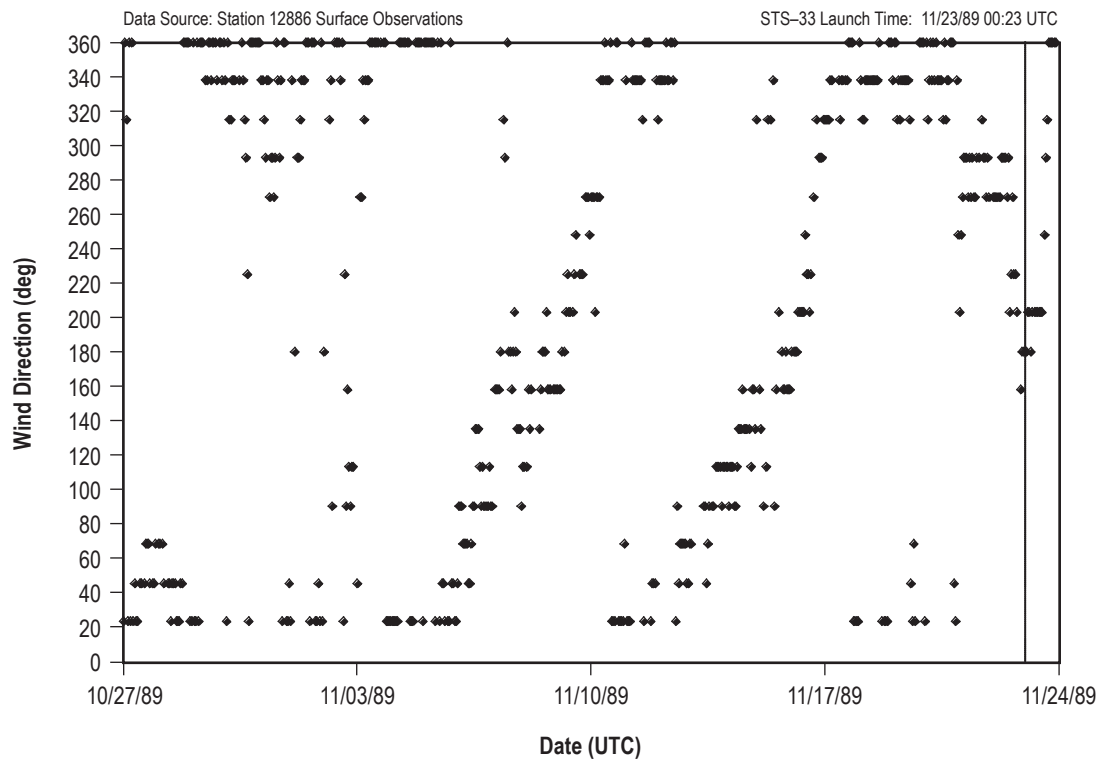


Figure 196. STS-33 hourly surface wind direction.



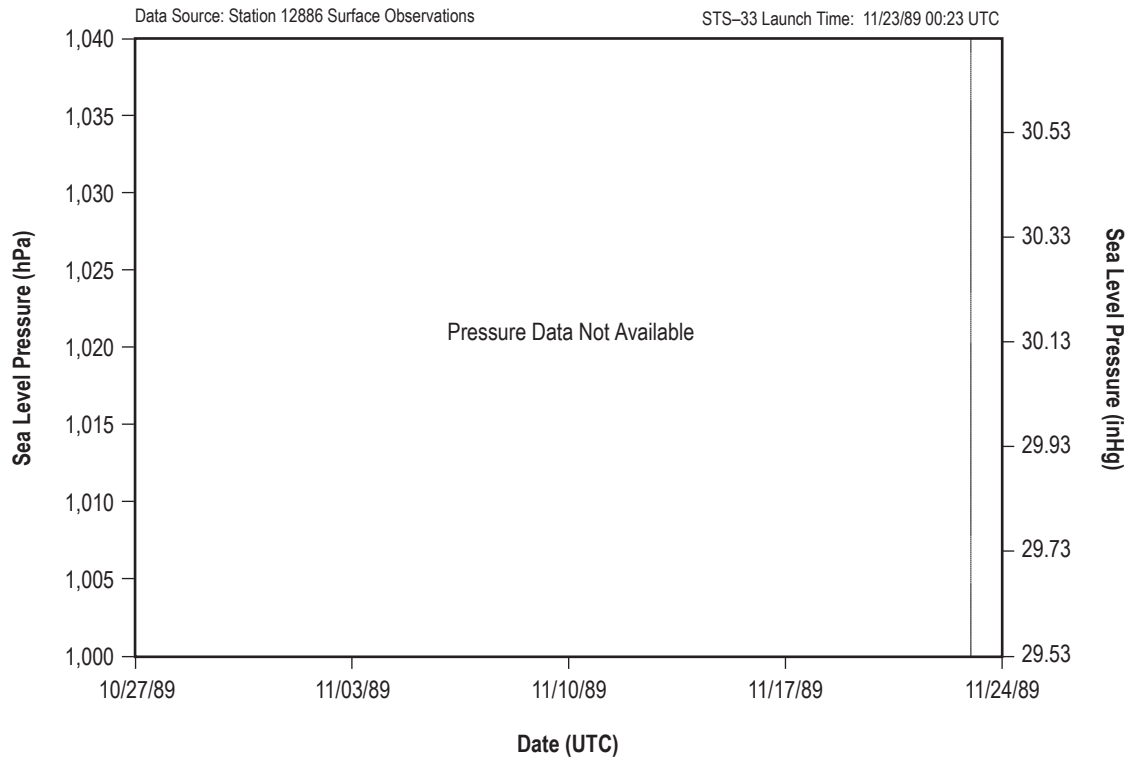


Figure 197. STS-33 hourly sea level pressure.

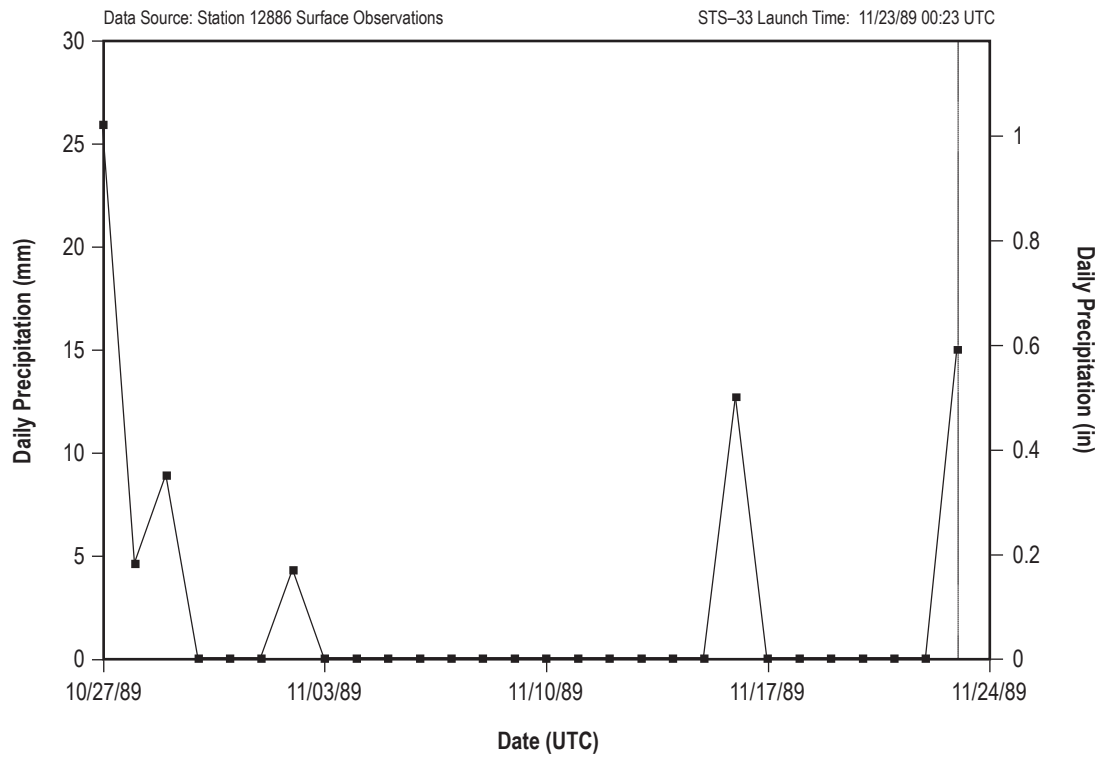


Figure 198. STS-33 daily precipitation totals.

### 5.33 STS–32

STS–32 was the ninth mission for *Columbia* (OV–102). It rolled out to pad 39A on November 28, 1989. STS–32 was exposed on the pad for 43 days and launched on January 9, 1990, at 12:35 UTC.

#### 5.33.1 STS–32 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–32.

#### 5.33.2 STS–32 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–32 are shown in table 69. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 69.

Table 69. STS–32 L–0 surface observations.

Temperature	12.2 °C (54 °F)
Relative humidity	100%
Sea level pressure	1,020.7 hPa (30.14 inHg)
Wind speed	2.1 m/s (4 kt) (1-min average)
Wind direction	246° (1-min average)
Sky condition	4/8 altocumulus at 2,743 m (9,000 ft); 1/8 cirrostratus at 9,144 m (30,000 ft)
Visibility	16.1 km (8.7 nmi)

#### 5.33.3 STS–32 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 199–204 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS–32 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 70. All data in this section were collected at station 12886.

Table 70. STS–32 pad exposure period hourly extremes.

Minimum temperature	–4.4 °C (24 °F)
Maximum temperature	28.9 °C (84 °F)
Minimum relative humidity	28%
Maximum relative humidity	100%
Minimum sea level pressure	1,013.9 hPa (29.94 inHg)*
Maximum sea level pressure	1,028.4 hPa (30.37 inHg)*
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 338°
Total precipitation	134.4 mm (5.29 in)

\* Pressure available only after January 1, 1990, at 05:00 UTC.

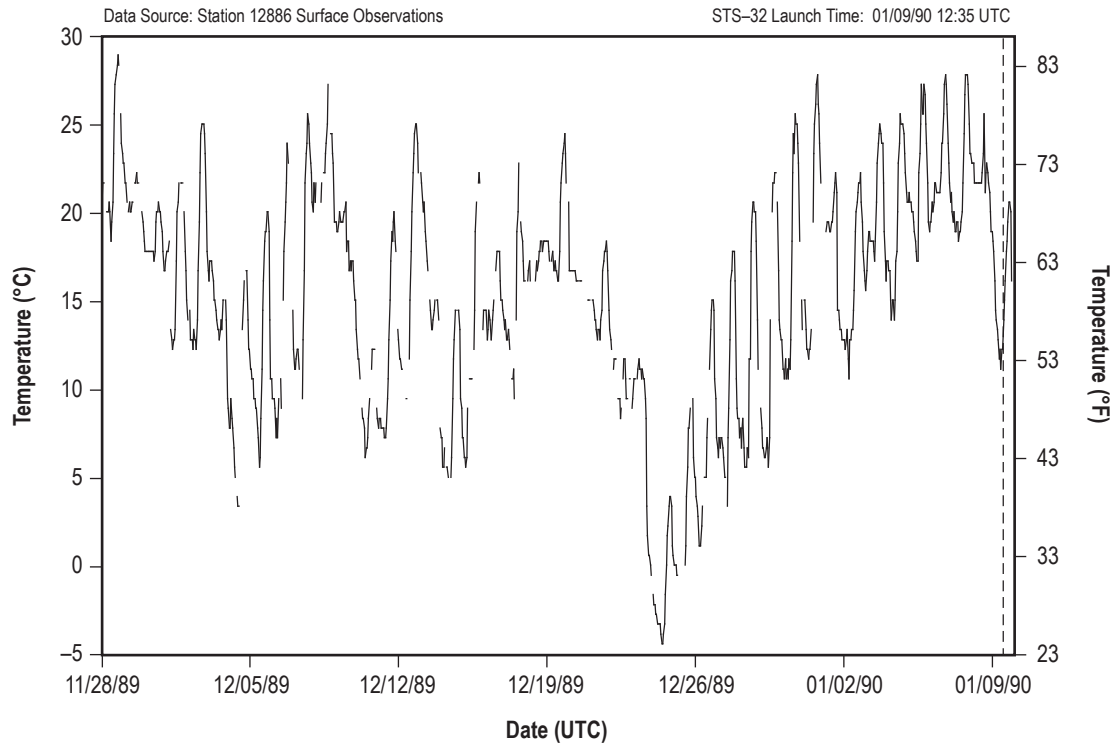


Figure 199. STS-32 hourly surface temperature.

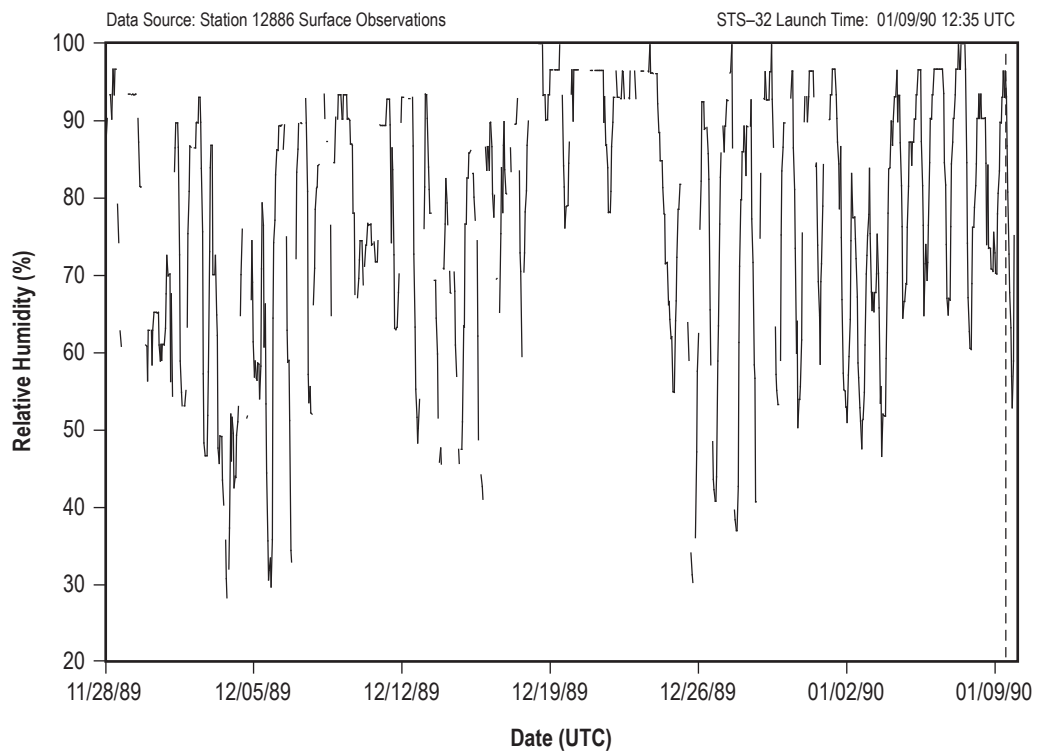


Figure 200. STS-32 hourly surface relative humidity.

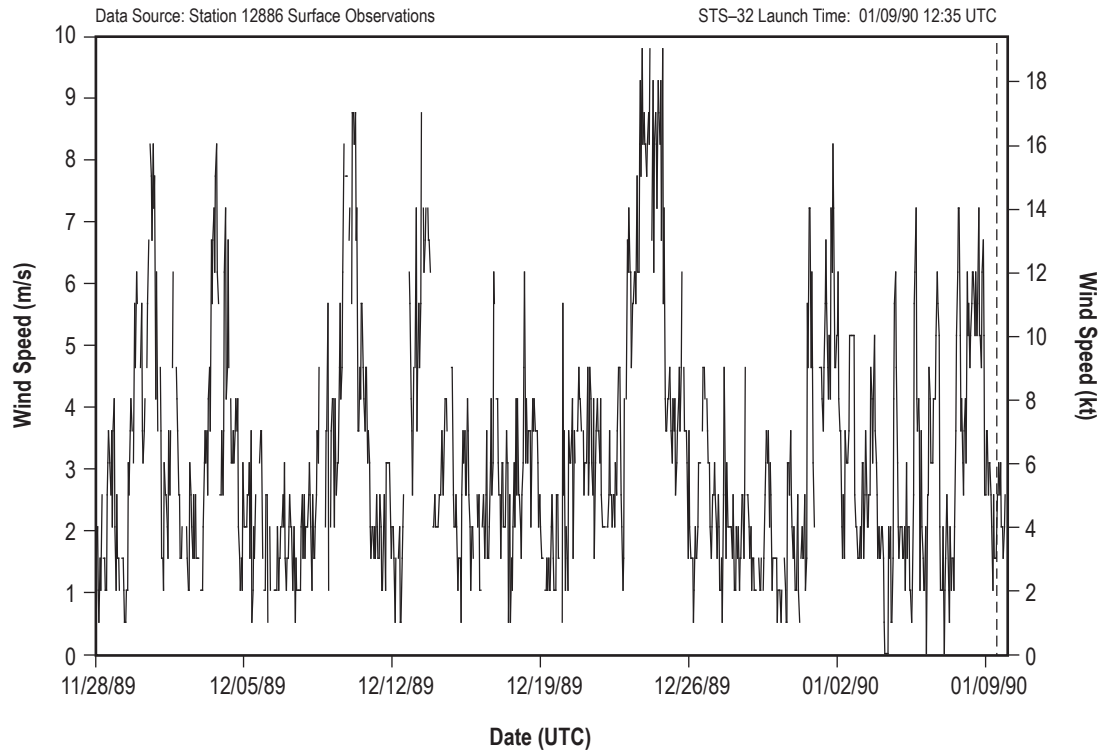


Figure 201. STS-32 hourly surface wind speed.

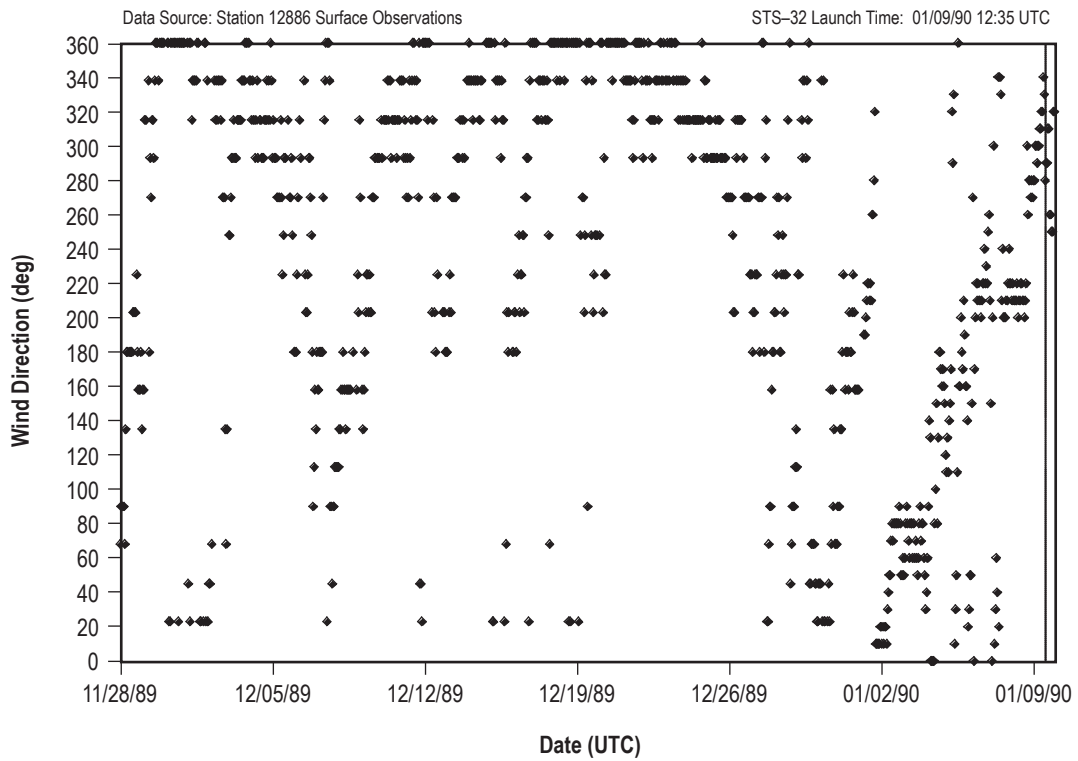


Figure 202. STS-32 hourly surface wind direction.

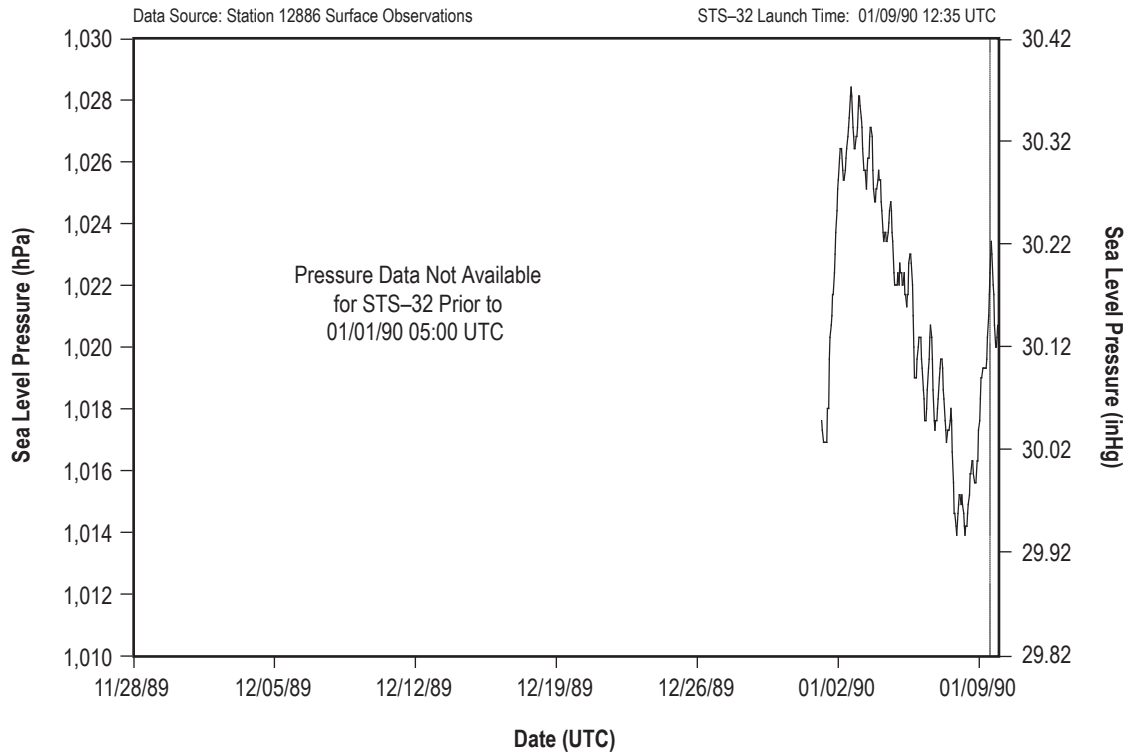


Figure 203. STS-32 hourly sea level pressure.

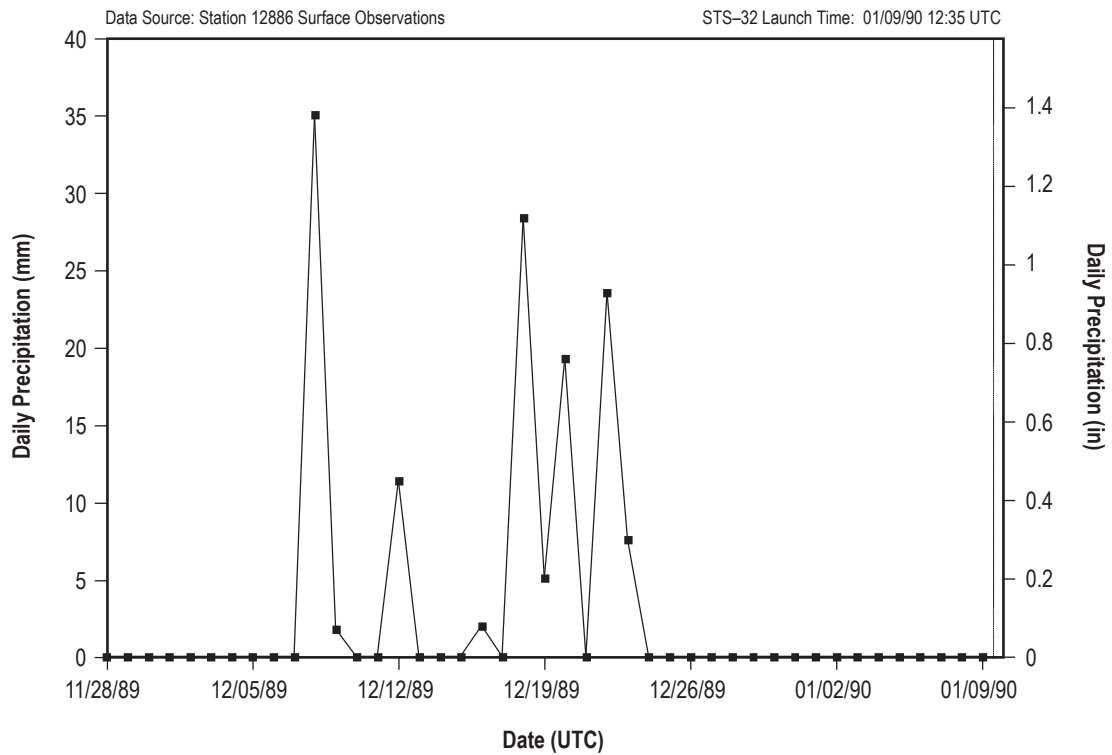


Figure 204. STS-32 daily precipitation totals.

### 5.34 STS-36

STS-36 was the sixth mission for *Atlantis* (OV-104). It rolled out to pad 39A on January 25, 1990. STS-36 was exposed on the pad for 35 days and launched on February 28, 1990, at 07:50 UTC.

#### 5.34.1 STS-36 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS-36.

#### 5.34.2 STS-36 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-36 are shown in table 71. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 71.

Table 71. STS-36 L-0 surface observations.

Temperature	18.3 °C (65 °F)
Relative humidity	71%
Sea level pressure	1,026.8 hPa (30.32 inHg)
Wind speed	7.2 m/s (13.9 kt) (1-min average)
Wind direction	72° (1-min average)
Sky condition	2/8 stratocumulus at 1,829 m (6,000 ft); 7/8 altocumulus at 2,286 m (7,500 ft)
Visibility	16.1 km (8.7 nmi)

#### 5.34.3 STS-36 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 205–210 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS-36 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 72. All data in this section were collected at station 12886.

Table 72. STS-36 pad exposure period hourly extremes.

Minimum temperature	7.8 °C (46 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	30%
Maximum relative humidity	100%
Minimum sea level pressure	1,008.8 hPa (29.79 inHg)
Maximum sea level pressure	1,034.9 hPa (30.56 inHg)
Maximum wind speed and associated wind direction	11.3 m/s (22 kt) 330°
Total precipitation	114 mm (4.49 in)

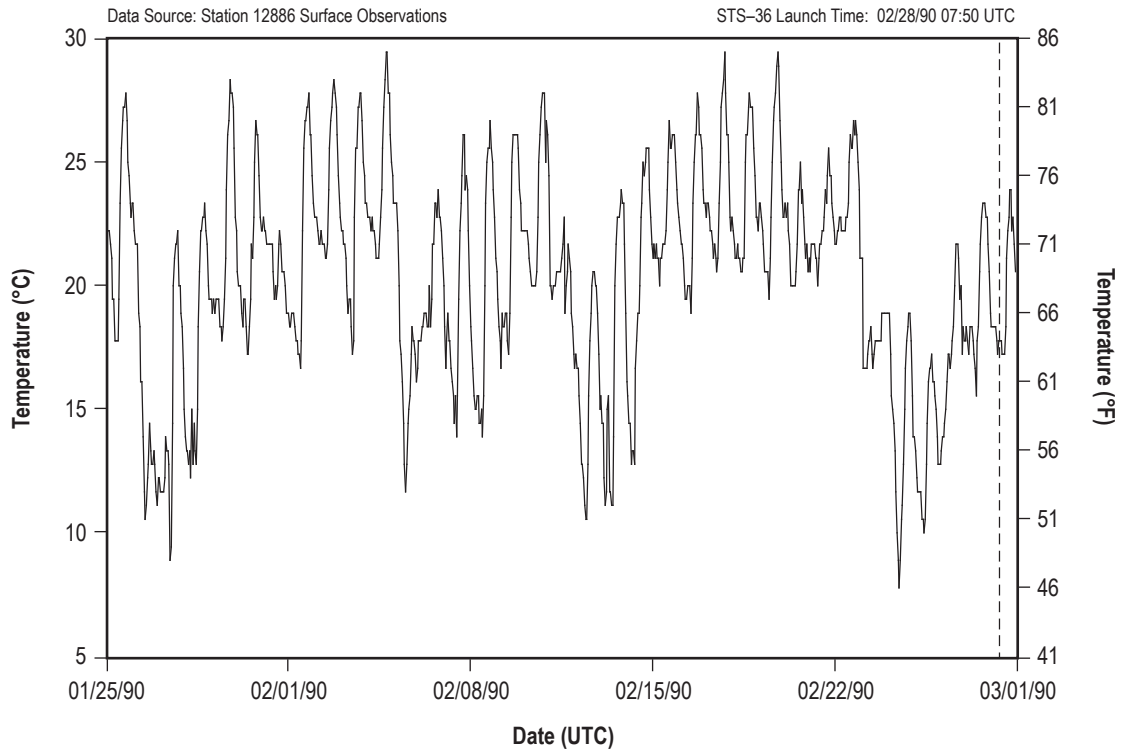


Figure 205. STS-36 hourly surface temperature.

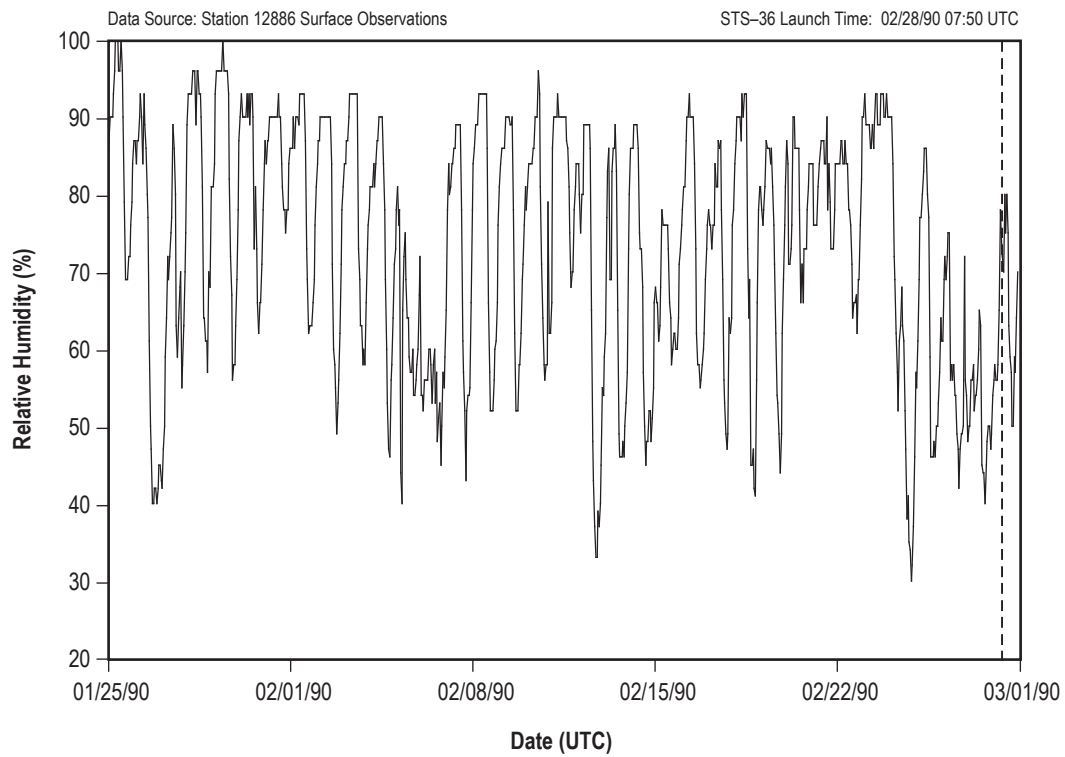


Figure 206. STS-36 hourly surface relative humidity.

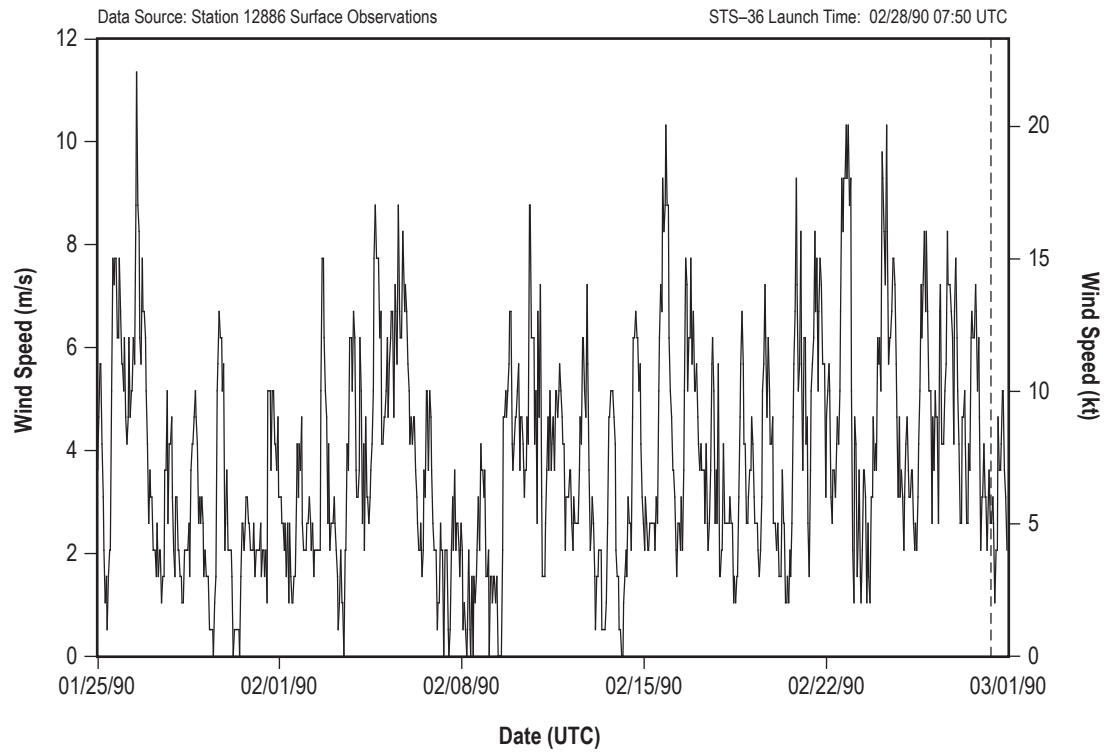


Figure 207. STS-36 hourly surface wind speed.

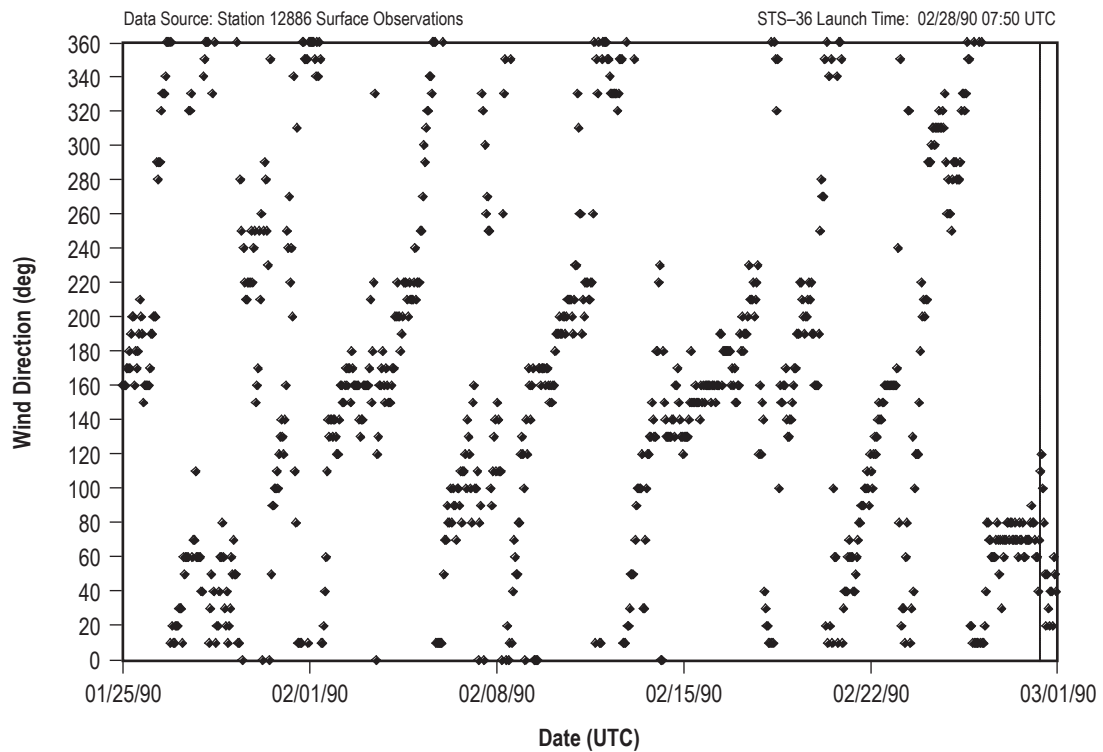


Figure 208. STS-36 hourly surface wind direction.



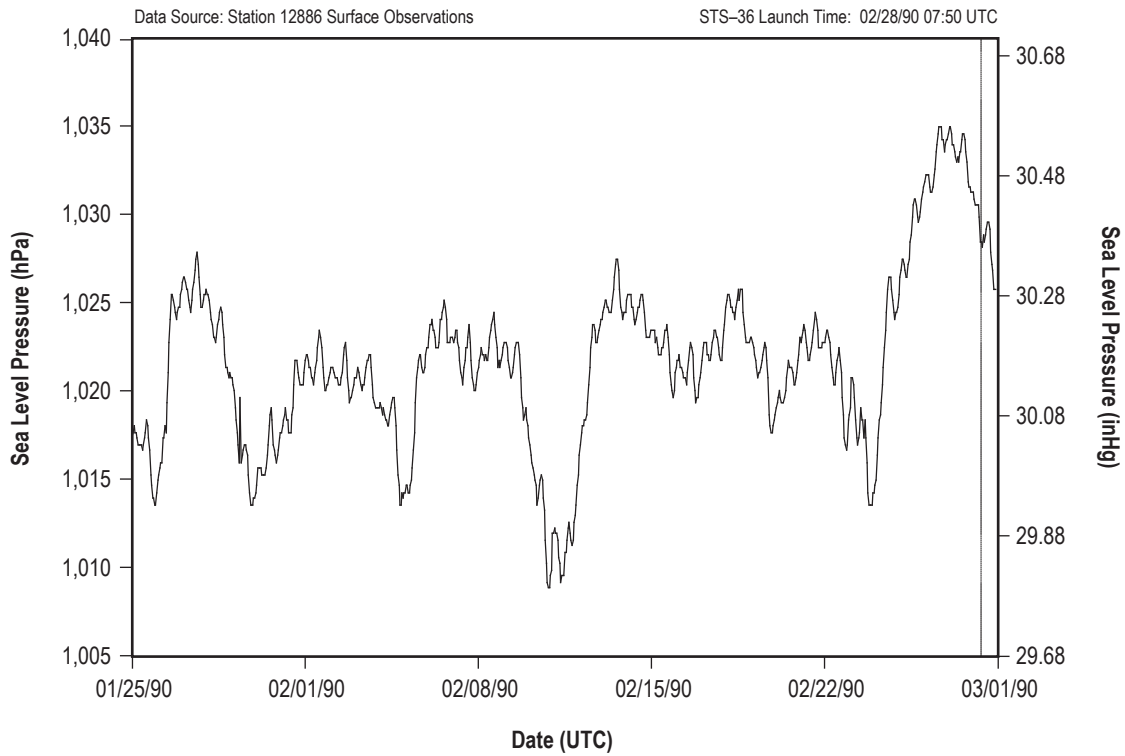


Figure 209. STS-36 hourly sea level pressure.

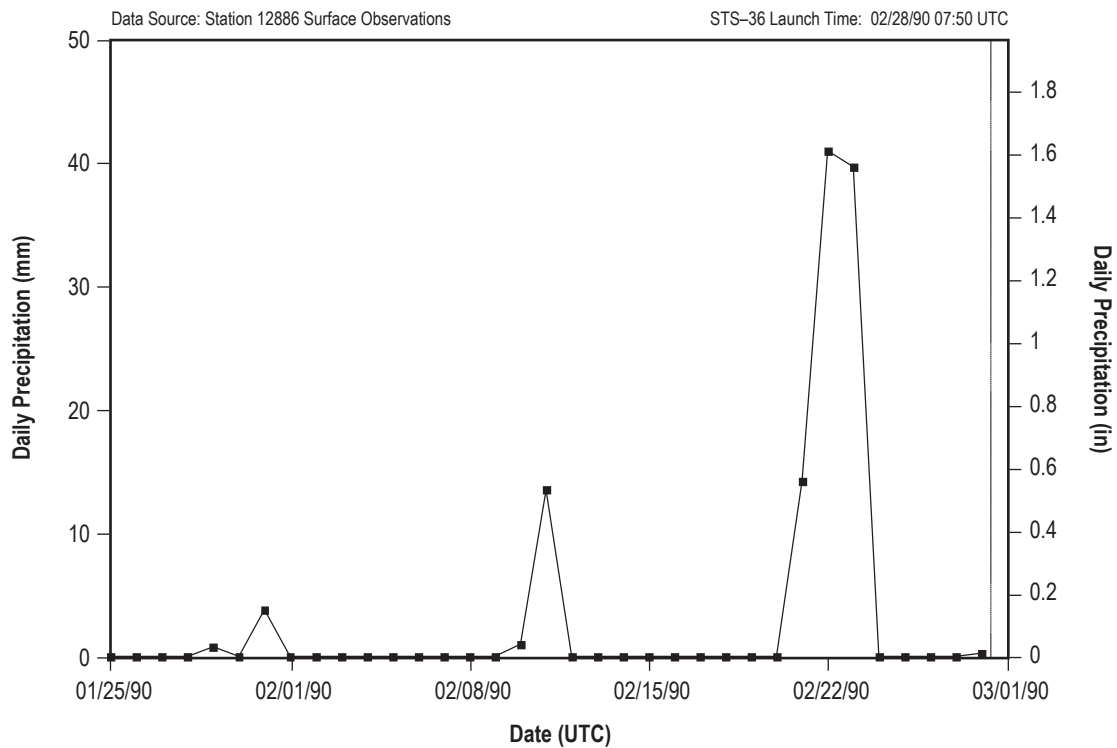


Figure 210. STS-36 daily precipitation totals.

## 5.35 STS-31

STS-31 was the 10th mission for *Discovery* (OV-103). It rolled out to pad 39B on March 15, 1990. STS-31 was exposed on the pad for 41 days and launched on April 24, 1990, at 12:34 UTC.

### 5.35.1 STS-31 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS-31.

### 5.35.2 STS-31 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-31 are shown in table 73. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 73.

Table 73. STS-31 L-0 surface observations.

Temperature	22.2 °C (72 °F)
Relative humidity	63%
Sea level pressure	1,020 hPa (30.12 inHg)
Wind speed	5.7 m/s (11 kt) (1-min average)
Wind direction	80° (1-min average)
Sky condition	3/8 stratocumulus at 1,280 m (4,199 ft)
Visibility	16.1 km (8.7 nmi)

### 5.35.3 STS-31 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 211–216 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS-31 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 74. All data in this section were collected at station 12886.

Table 74. STS-31 pad exposure period hourly extremes.

Minimum temperature	9.4 °C (49 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	29%
Maximum relative humidity	100%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,029.1 hPa (30.39 inHg)
Maximum wind speed and associated wind direction	10.3 m/s (20 kt) 360°
Total precipitation	63 mm (2.48 in)

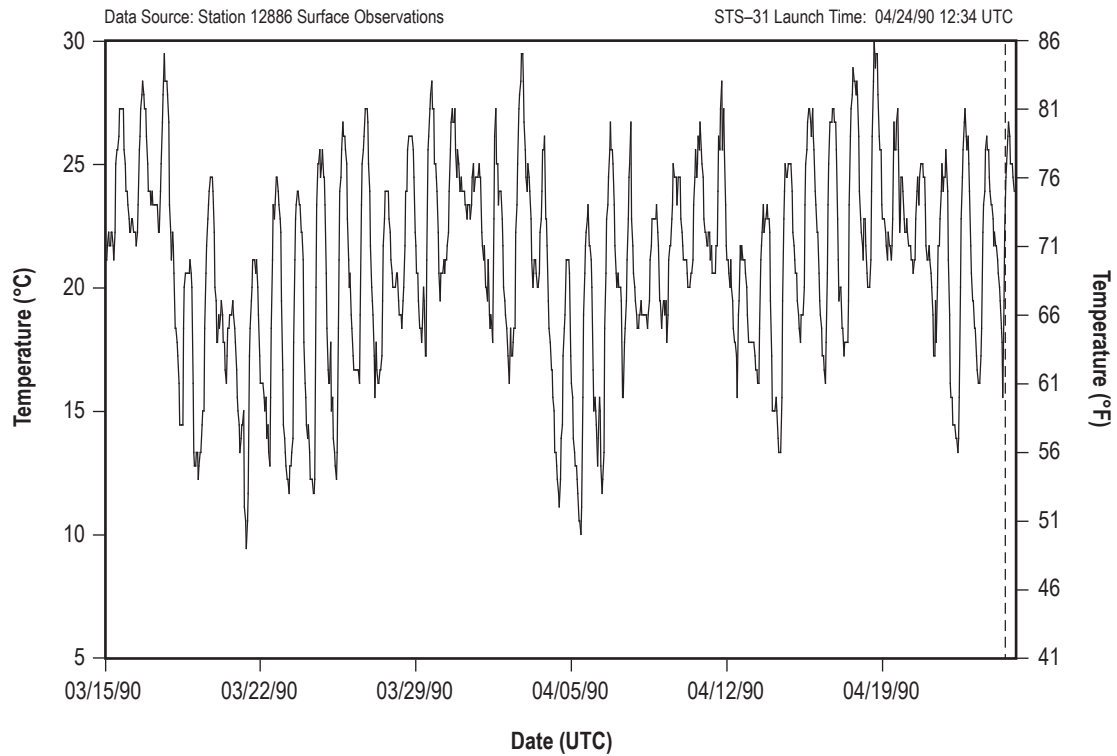


Figure 211. STS-31 hourly surface temperature.

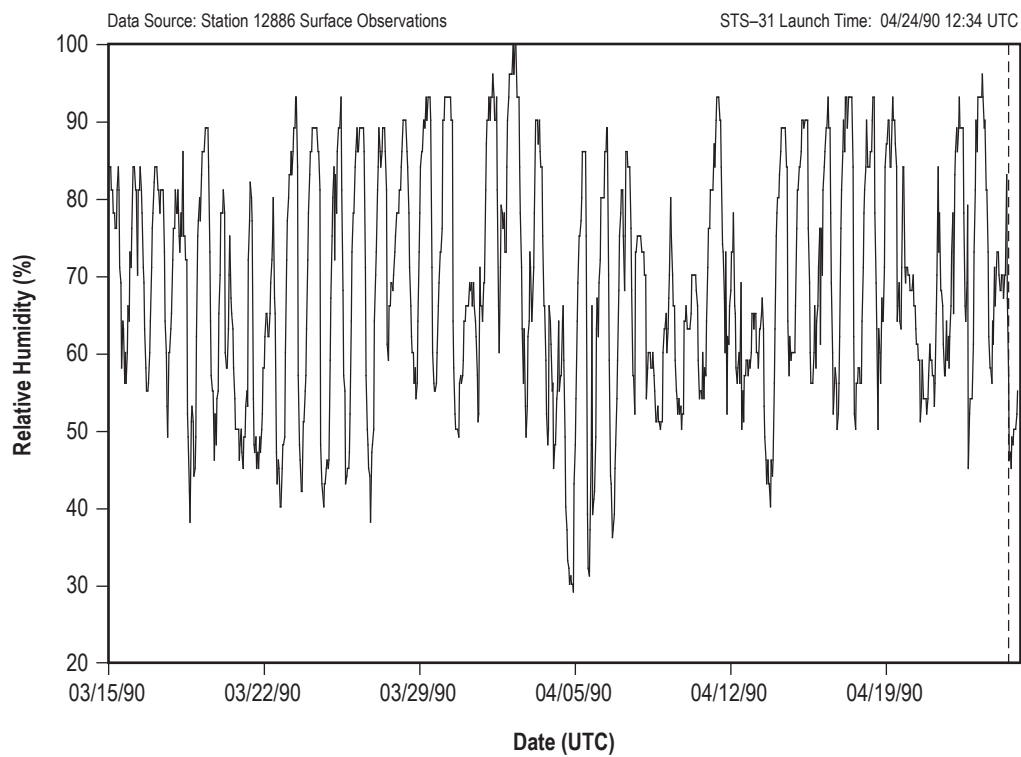


Figure 212. STS-31 hourly surface relative humidity.

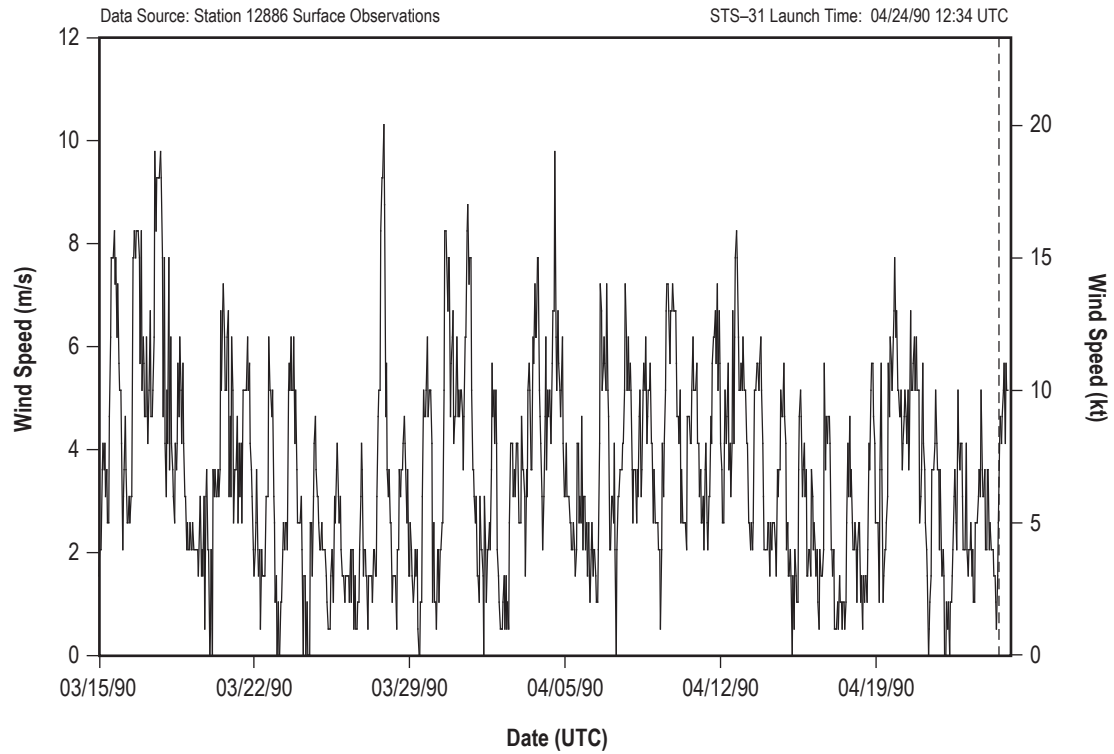


Figure 213. STS-31 hourly surface wind speed.

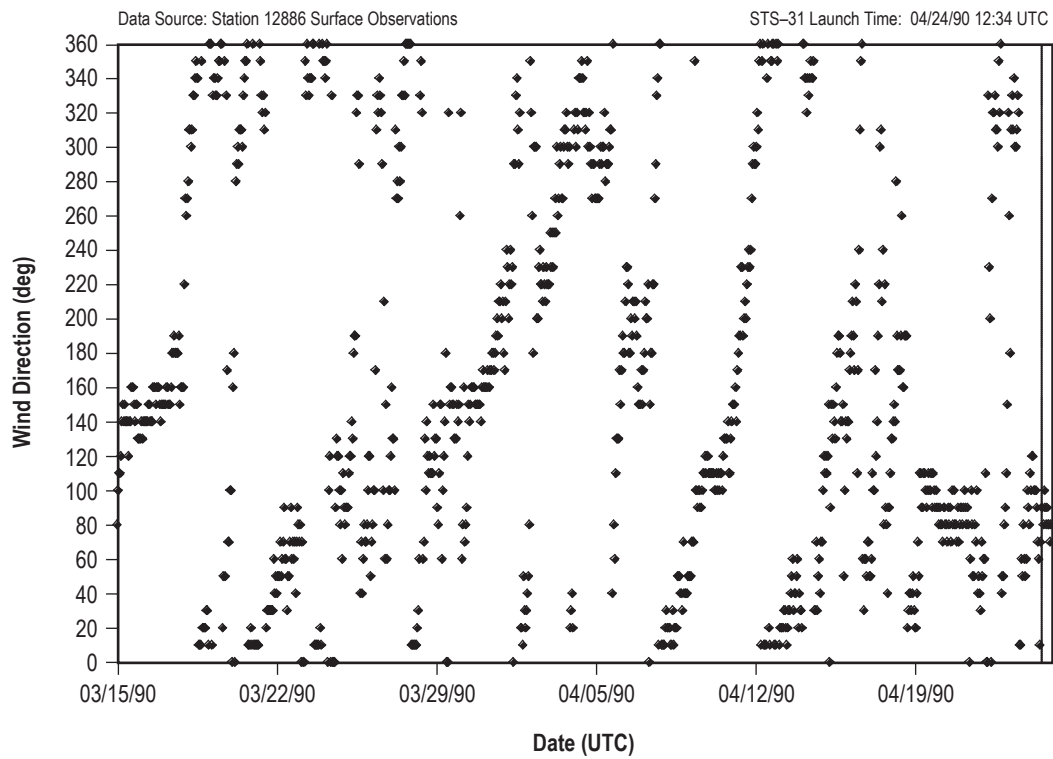


Figure 214. STS-31 hourly surface wind direction.

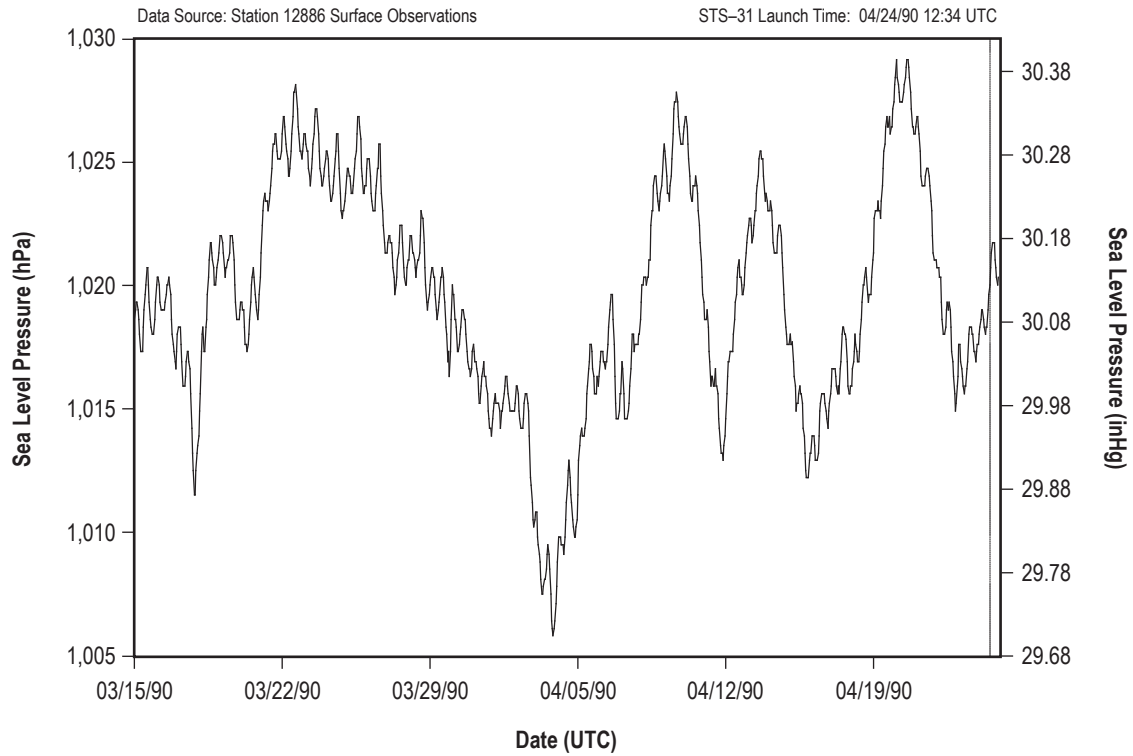


Figure 215. STS-31 hourly sea level pressure.

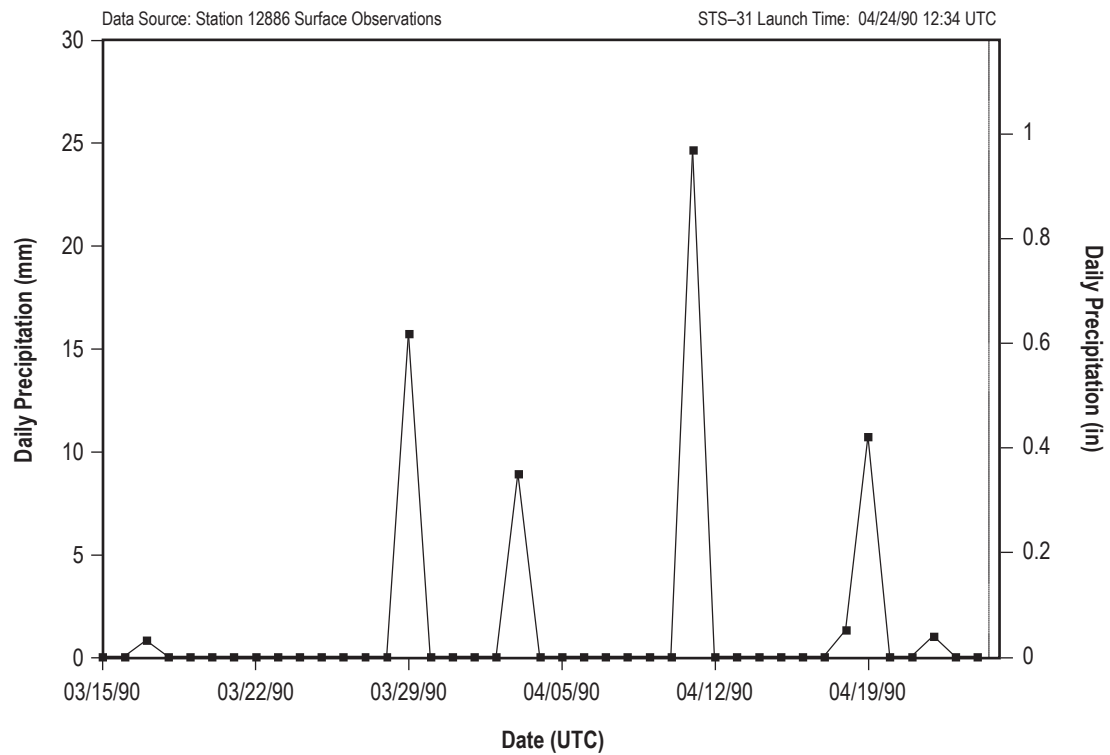


Figure 216. STS-31 daily precipitation totals.

### 5.36 STS-41

STS-41 was the 11th mission for *Discovery* (OV-103). It rolled out to pad 39B on September 4, 1990. STS-41 was exposed on the pad for 33 days and launched on October 6, 1990, at 11:47 UTC.

#### 5.36.1 STS-41 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS-41.

#### 5.36.2 STS-41 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-41 are shown in table 75. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 75.

Table 75. STS-41 L-0 surface observations.

Temperature	27.2 °C (81 °F)
Relative humidity	73%
Sea level pressure	1,018.3 hPa (30.07 inHg)
Wind speed	7.2 m/s (14 kt) (1-min average)
Wind direction	90° (1-min average)
Sky condition	2/8 cumulus at 914 m (3,000 ft); 1/8 altocumulus at 2,134 m (7,000 ft)
Visibility	16.1 km (8.7 nmi)

#### 5.36.3 STS-41 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 217–222 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS-41 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 76. All data in this section were collected at station 12886.

Table 76. STS-41 pad exposure period hourly extremes.

Minimum temperature	18.3 °C (65 °F)
Maximum temperature	35 °C (95 °F)
Minimum relative humidity	43%
Maximum relative humidity	100%
Minimum sea level pressure	1,010.5 hPa (29.84 inHg)
Maximum sea level pressure	1,022.4 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	7.7 m/s (15 kt) 60°
Total precipitation	57.4 mm (2.26 in)

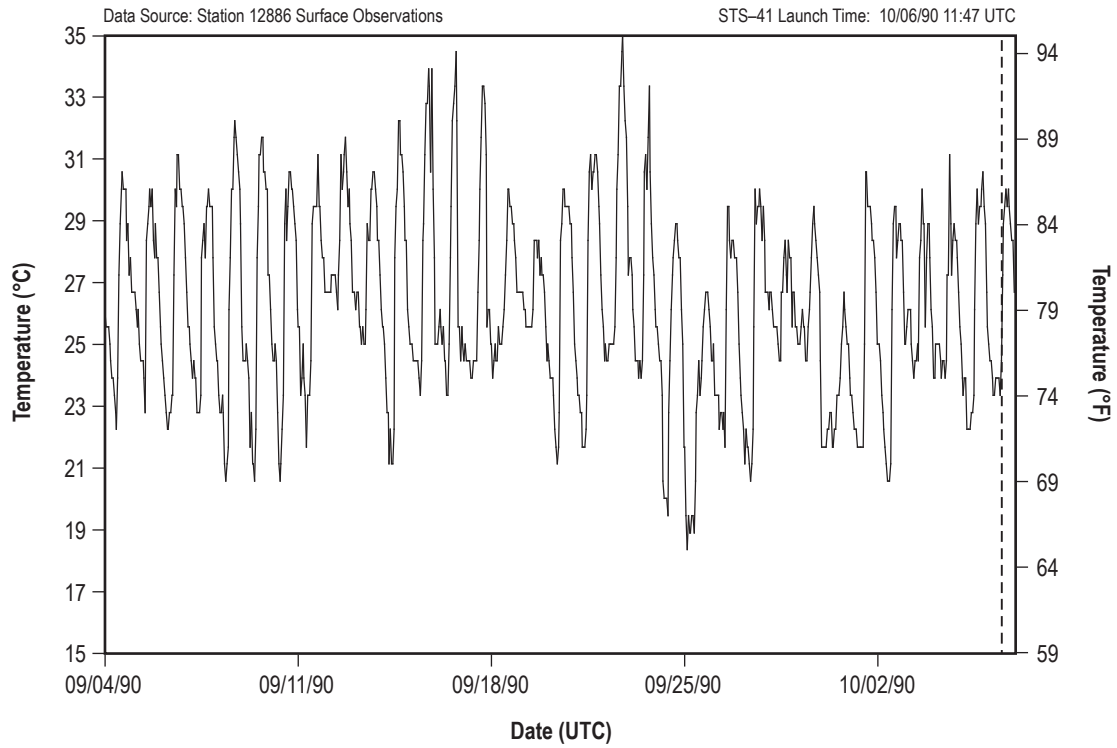


Figure 217. STS-41 hourly surface temperature.

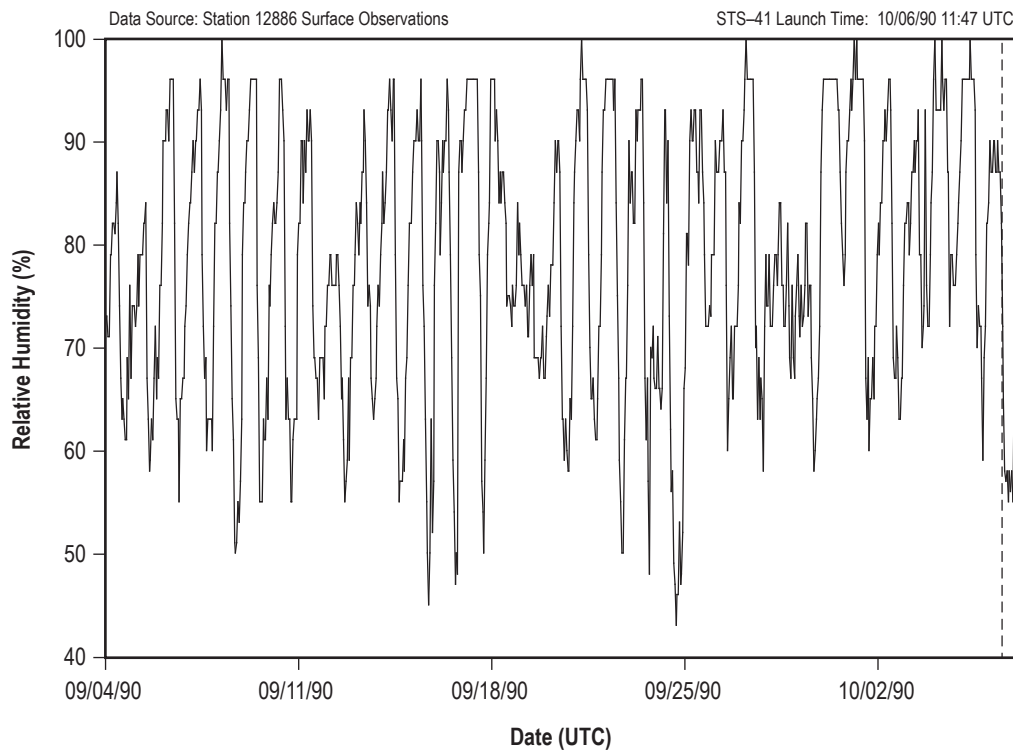


Figure 218. STS-41 hourly surface relative humidity.

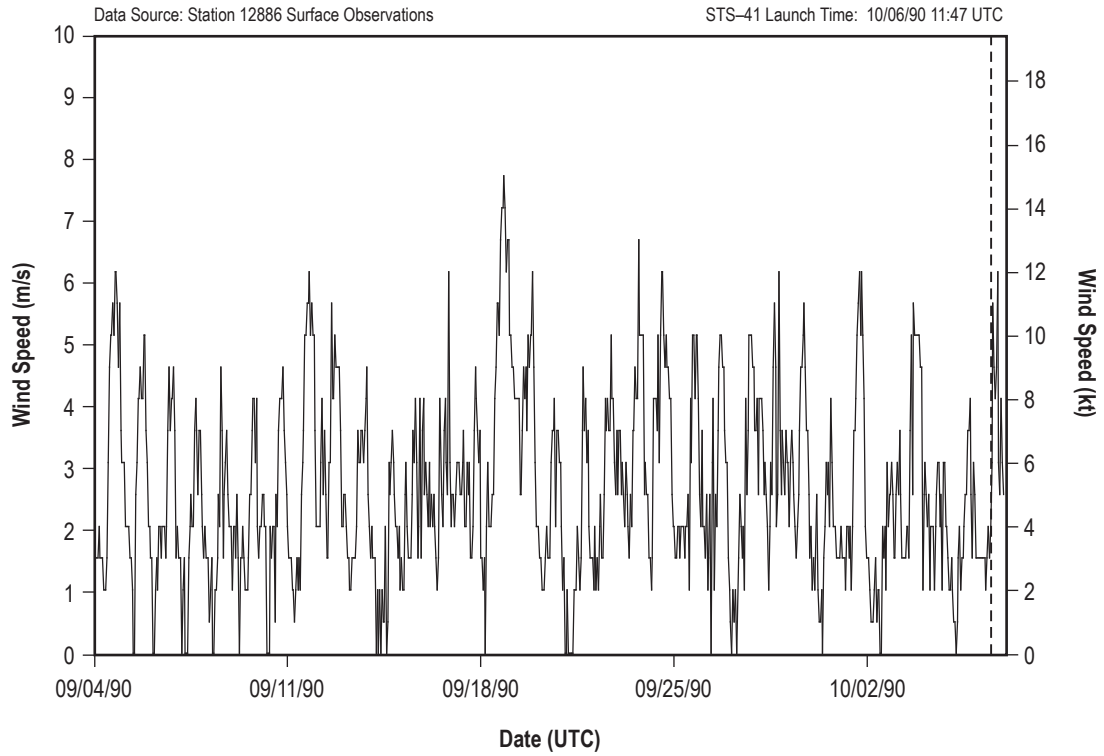


Figure 219. STS-41 hourly surface wind speed.

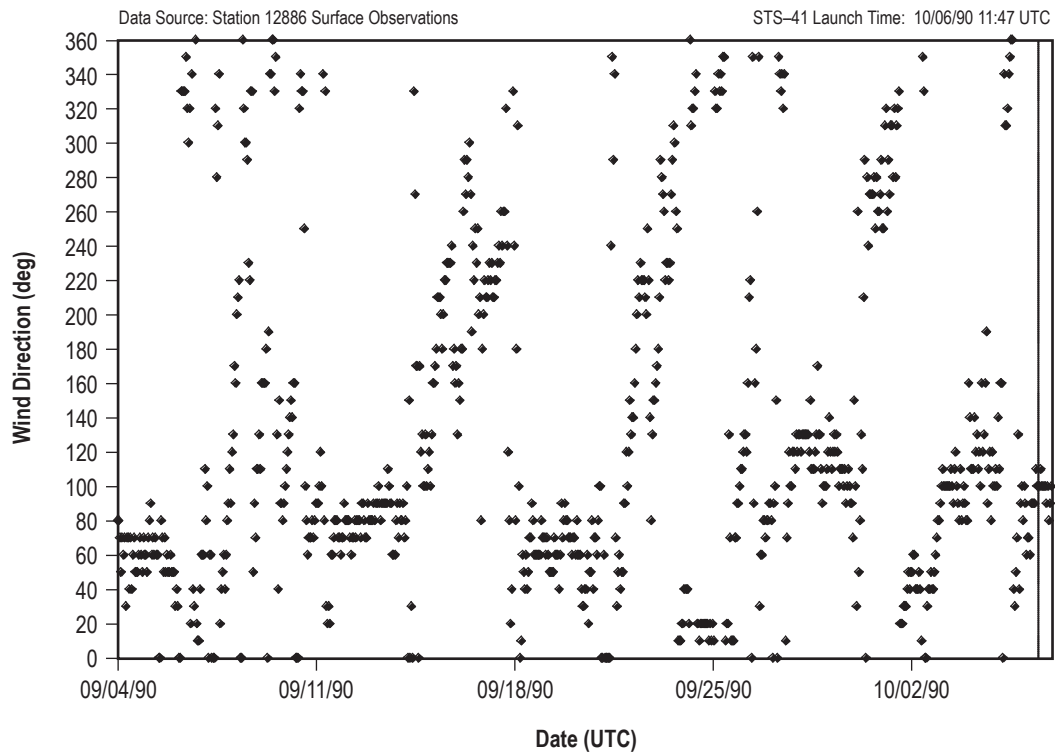


Figure 220. STS-41 hourly surface wind direction.



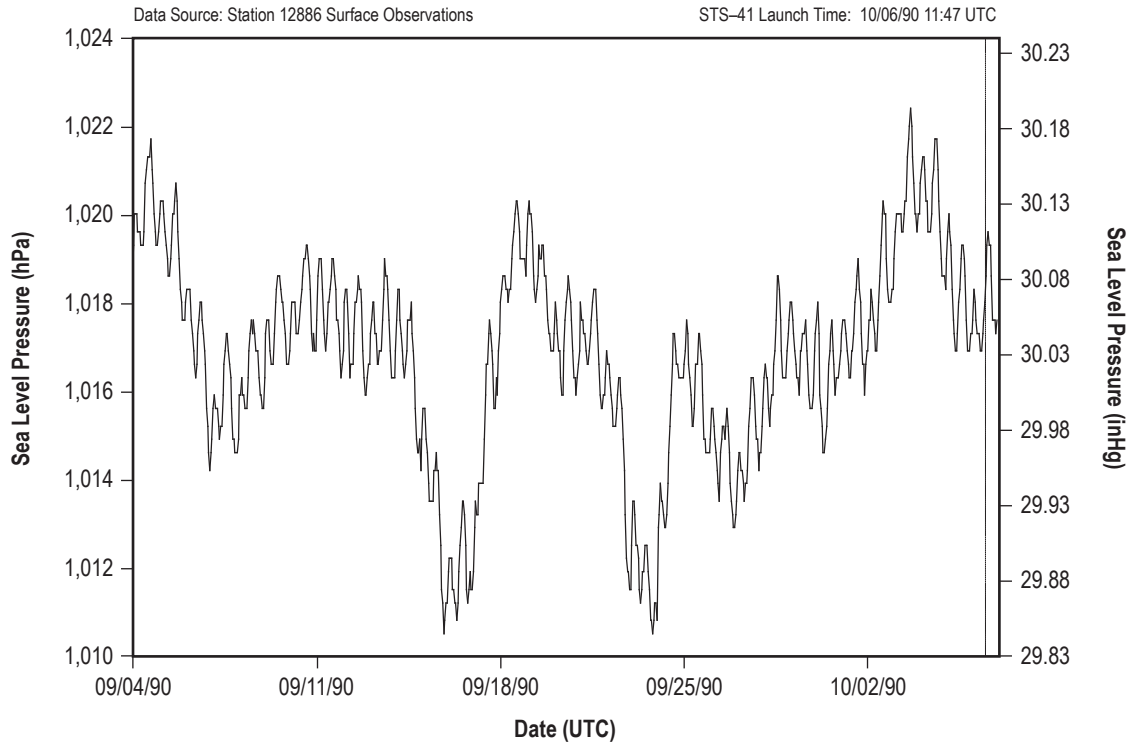


Figure 221. STS-41 hourly sea level pressure.

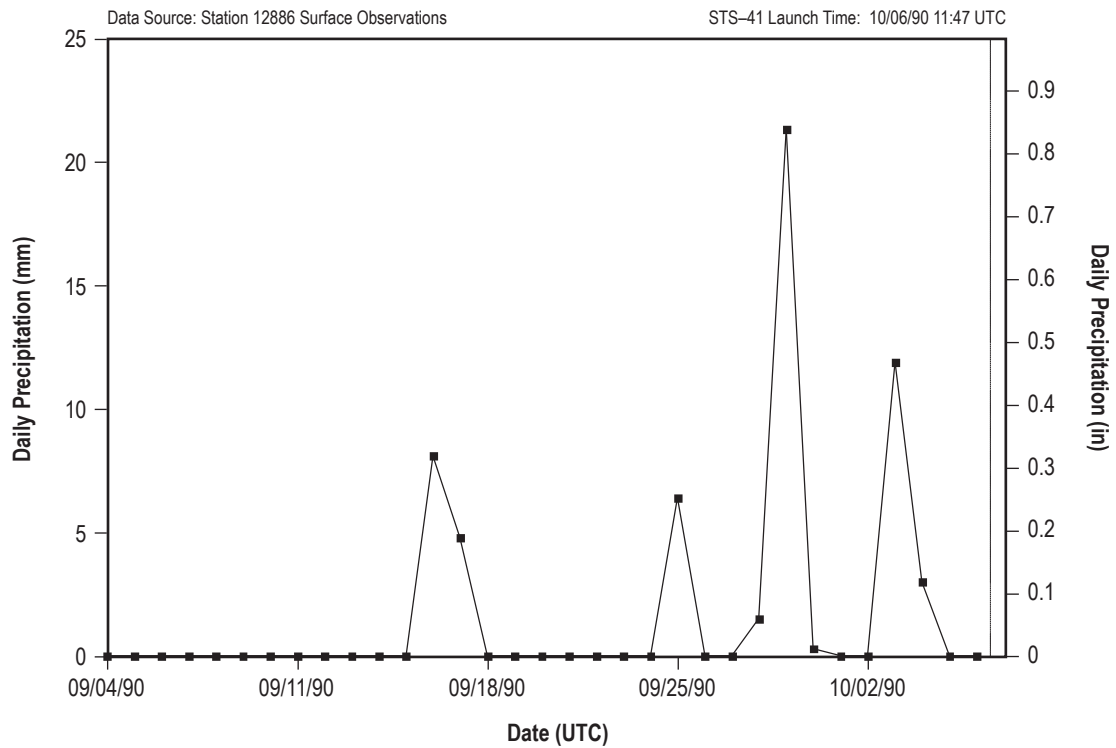


Figure 222. STS-41 daily precipitation totals.

### 5.37 STS–38

STS–38 was the seventh mission for *Atlantis* (OV–104). It rolled out to pad 39A the first time on June 18, 1990. It was rolled back from the pad on August 9, 1990. STS–38 rolled out to pad 39A the second time on October 12, 1990. STS–38 was exposed on the pad for a total of 88 days (53 days after the first rollout and 35 days after the second rollout) and launched on November 15, 1990, at 23:48 UTC.

#### 5.37.1 STS–38 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS–38.

#### 5.37.2 STS–38 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–38 are shown in table 77. Temperature and relative humidity were obtained from pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 77.

Table 77. STS–38 L–0 surface observations.

Temperature	21.1 °C (70 °F)
Relative humidity	63%
Sea level pressure	1,025.7 hPa (30.29 inHg)
Wind speed	8.8 m/s (17 kt) (1-min average)
Wind direction	84° (1-min average)
Sky condition	1/8 stratocumulus at 1,219 m (4,000 ft); 1/8 altocumulus at 2,134 m (7,000 ft)
Visibility	16.1 km (8.7 nmi)

#### 5.37.3 STS–38 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 223–228 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure and daily precipitation for the STS–38 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 78. All data in this section were collected at station 12886.

Table 78. STS–38 pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	36.1 °C (97 °F)
Minimum relative humidity	30%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,028.8 hPa (30.38 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 230°
Total precipitation	427.5 mm (16.83 in)

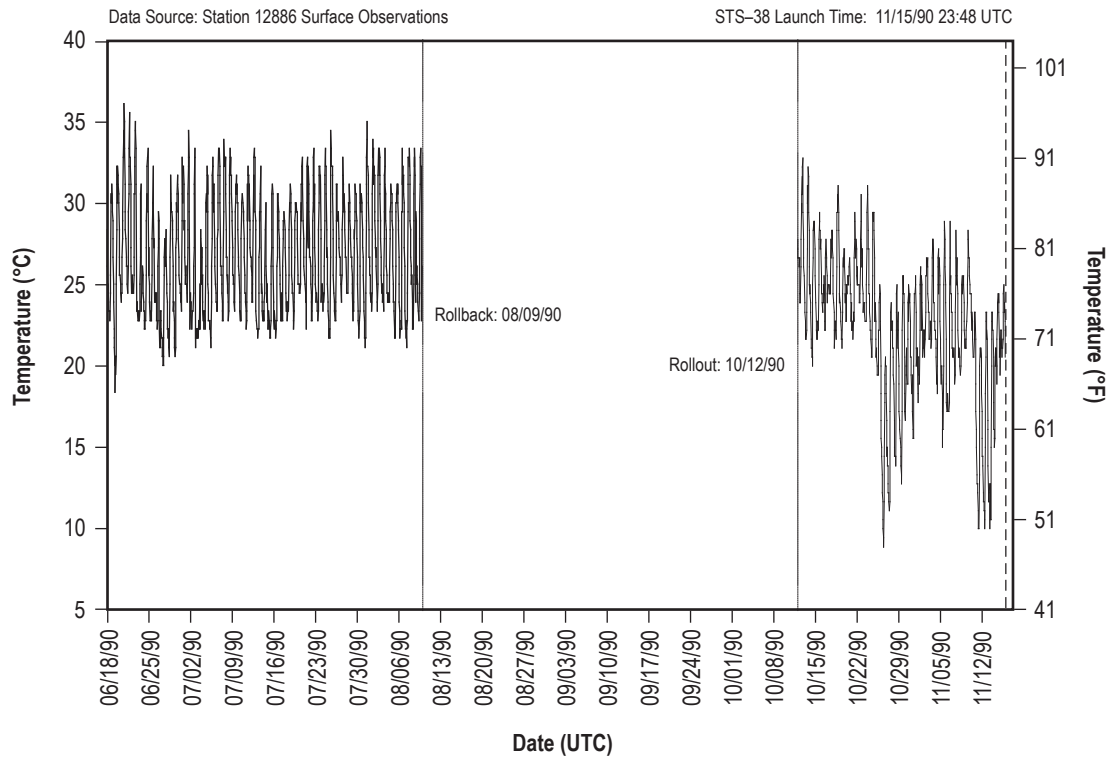


Figure 223. STS-38 hourly surface temperature.

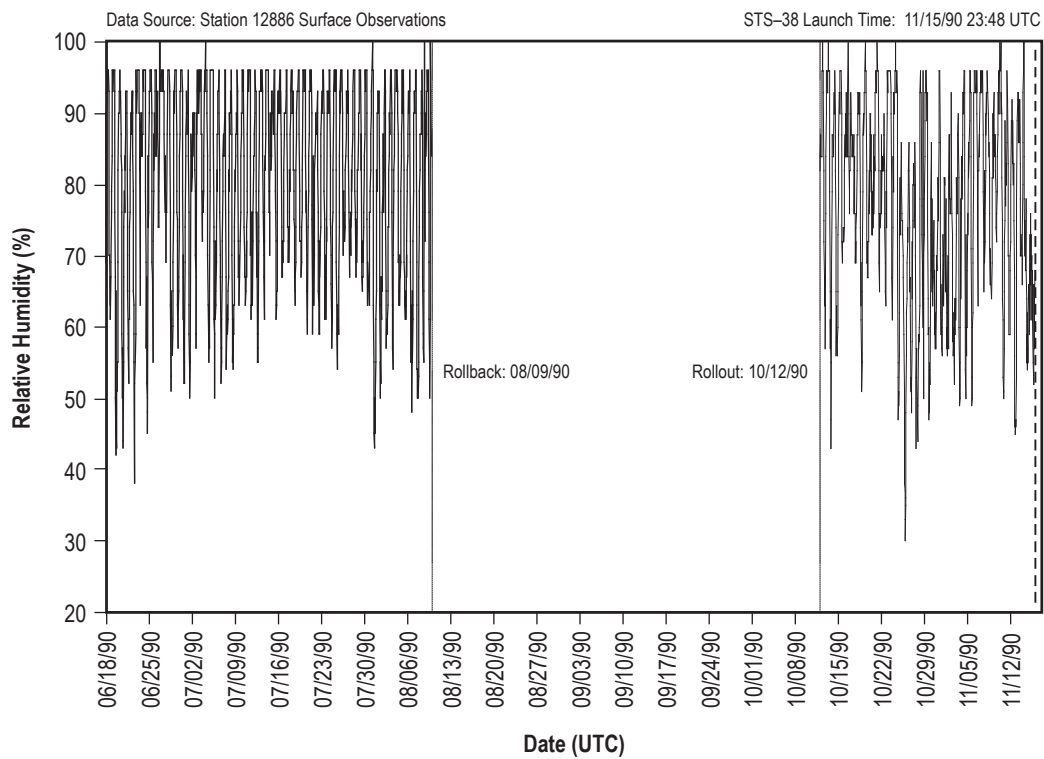


Figure 224. STS-38 hourly surface relative humidity.

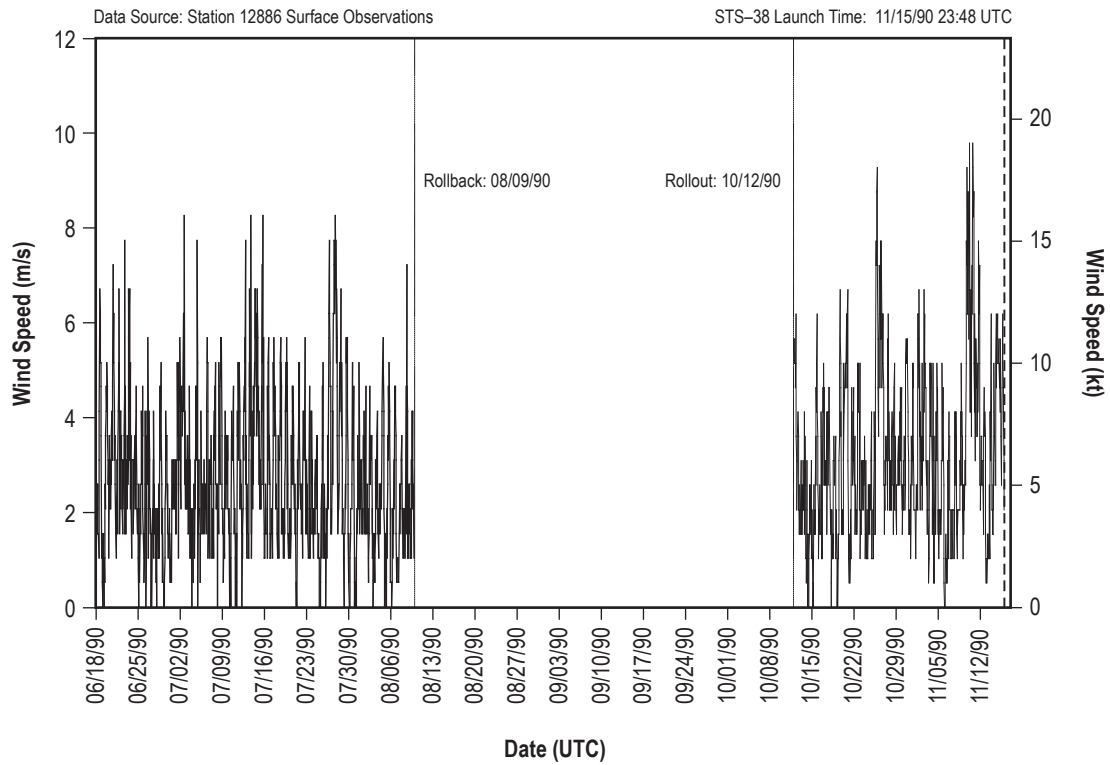


Figure 225. STS-38 hourly surface wind speed.

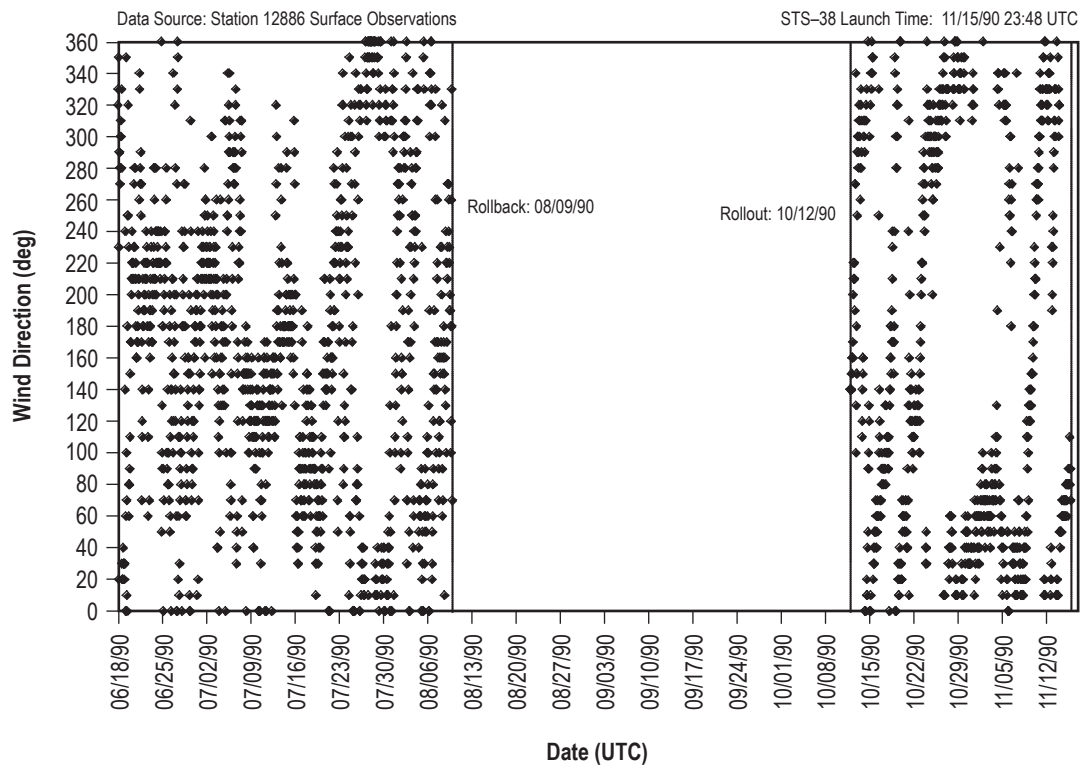


Figure 226. STS-38 hourly surface wind direction.

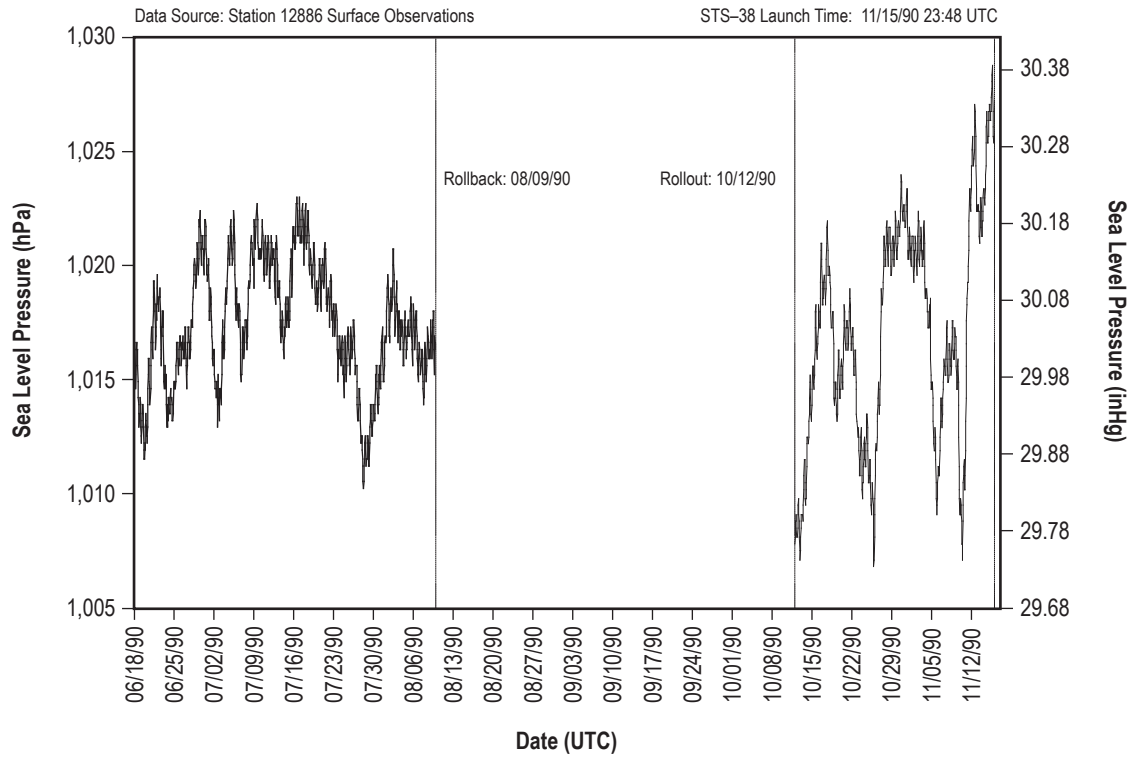


Figure 227. STS-38 hourly sea level pressure.

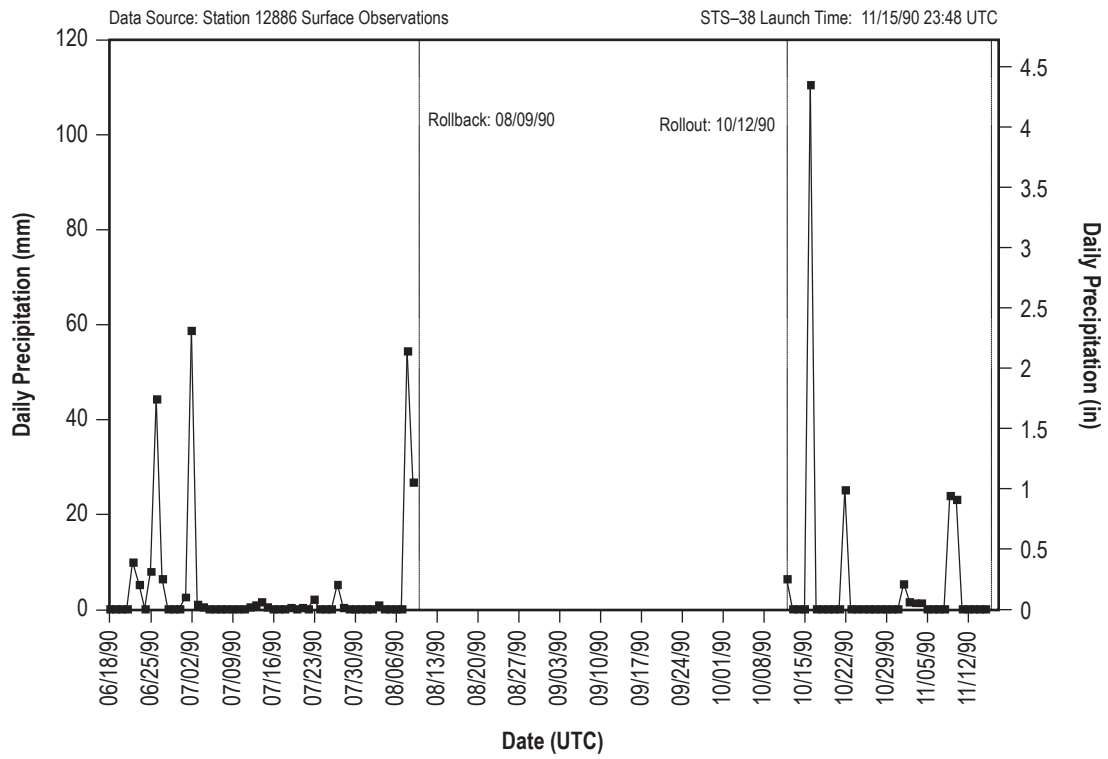


Figure 228. STS-38 daily precipitation totals.

### 5.38 STS-35

STS-35 was the 10th mission for *Columbia* (OV-102). It rolled out to pad 39A the first time on April 22, 1990, and was rolled back from the pad on June 12, 1990. STS-35 rolled out to pad 39A the second time on August 9, 1990, and was rolled back from the pad on October 9, 1990. STS-35 rolled out to pad 39B on October 14, 1990. STS-35 was exposed on the pad for a total of 164 days (52 days after the first rollout, 62 days after the second rollout, and 50 days after the third rollout) and launched on December 2, 1990, at 06:49 UTC.

#### 5.38.1 STS-35 Pad Exposure Period Data Archive Sources

Only data from station 12886 have been archived for the pad exposure period for STS-35.

#### 5.38.2 STS-35 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-35 are shown in table 79. Temperature and relative humidity were obtained from pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at Cape Canaveral Air Force station (XMR). Pressure has been adjusted to sea level in table 79.

Table 79. STS-35 L-0 surface observations.

Temperature	21.7 °C (71 °F)
Relative humidity	61%
Sea level pressure	1,024 hPa (30.24 inHg)
Wind speed	6.6 m/s (12.9 kt) (1-min average)
Wind direction	88° (1-min average)
Sky condition	1/8 altocumulus at 610 m (2,000 ft); 8/8 altostratus at 2,134 m (7,000 ft)
Visibility	16.1 km (8.7 nmi)

#### 5.38.3 STS-35 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 229–234 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS-35 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 80. All data in this section were collected at station 12886.

Table 80. STS-35 pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	35 °C (95 °F)
Minimum relative humidity	30%
Maximum relative humidity	100%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,028.8 hPa (30.38 inHg)
Maximum wind speed and associated wind direction	17 m/s (33 kt) 200°
Total precipitation	521.2 mm (20.52 in)

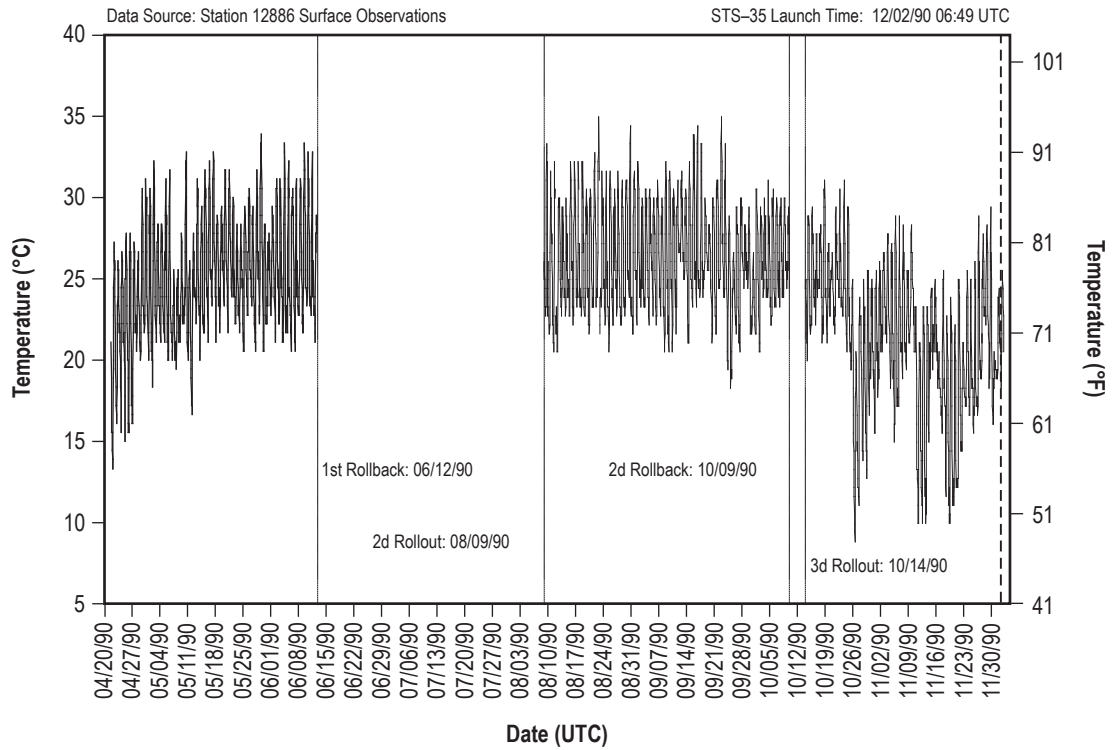


Figure 229. STS-35 hourly surface temperature.

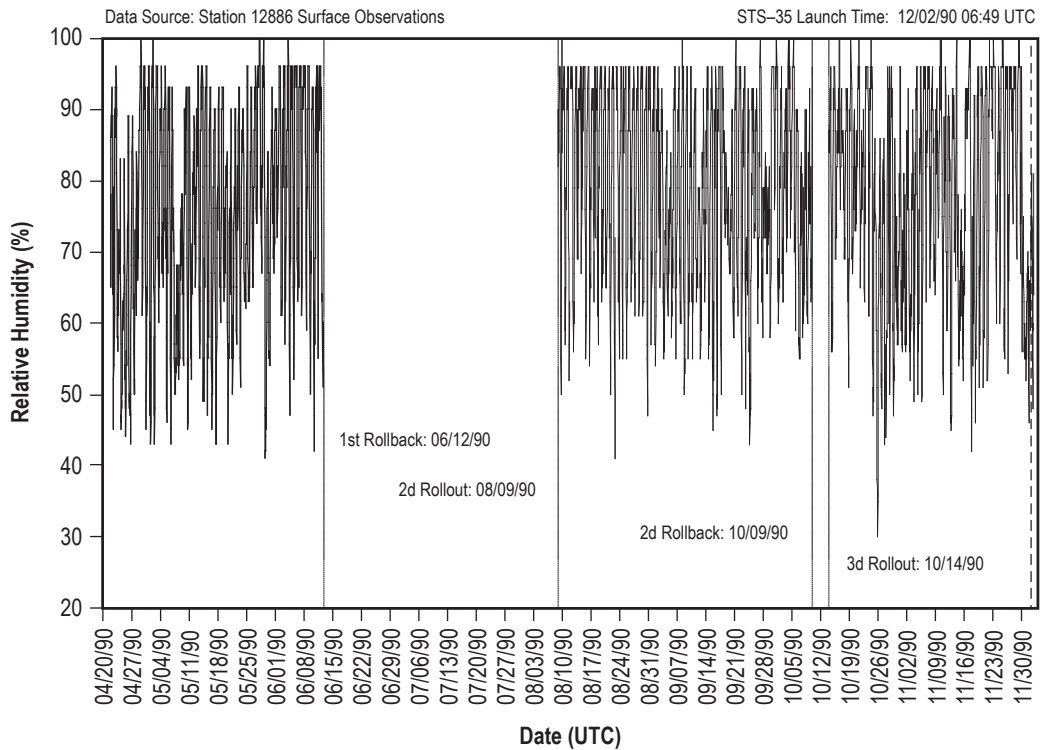


Figure 230. STS-35 hourly surface relative humidity.

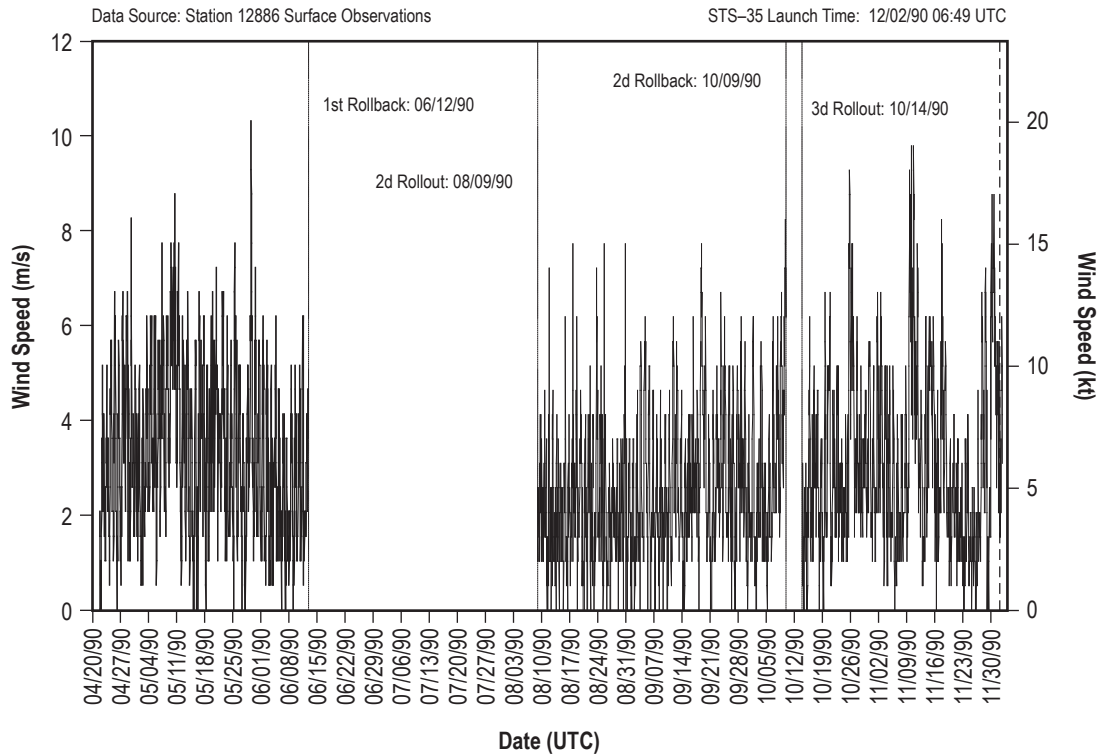


Figure 231. STS-35 hourly surface wind speed.

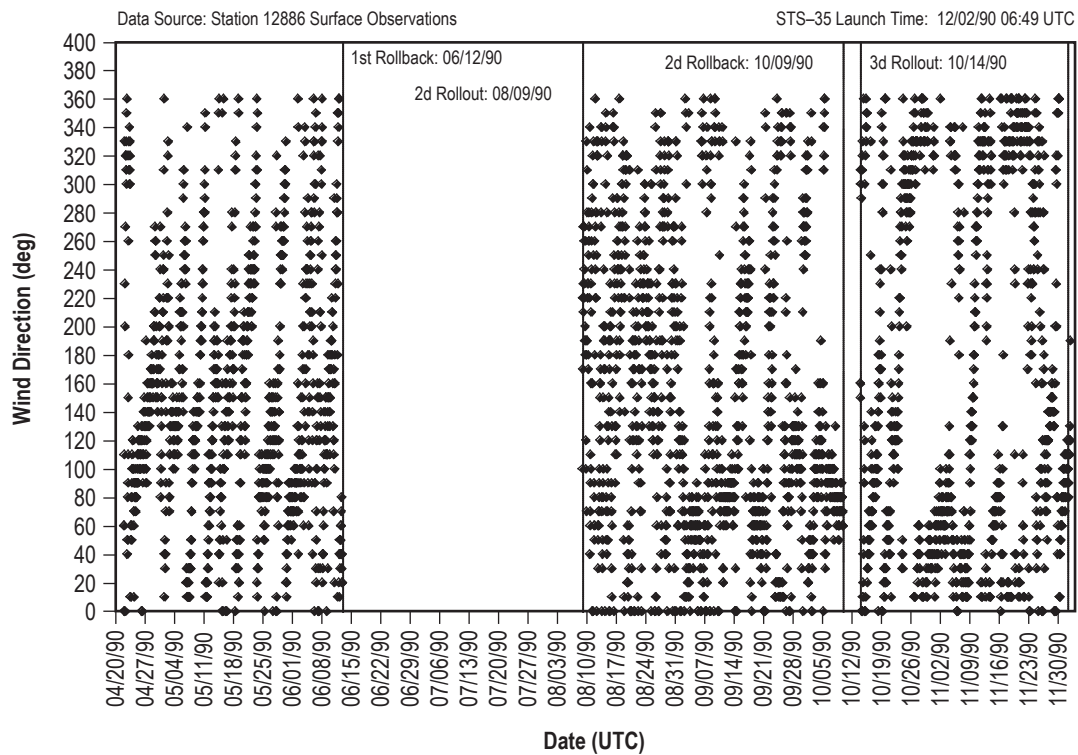


Figure 232. STS-35 hourly surface wind direction.



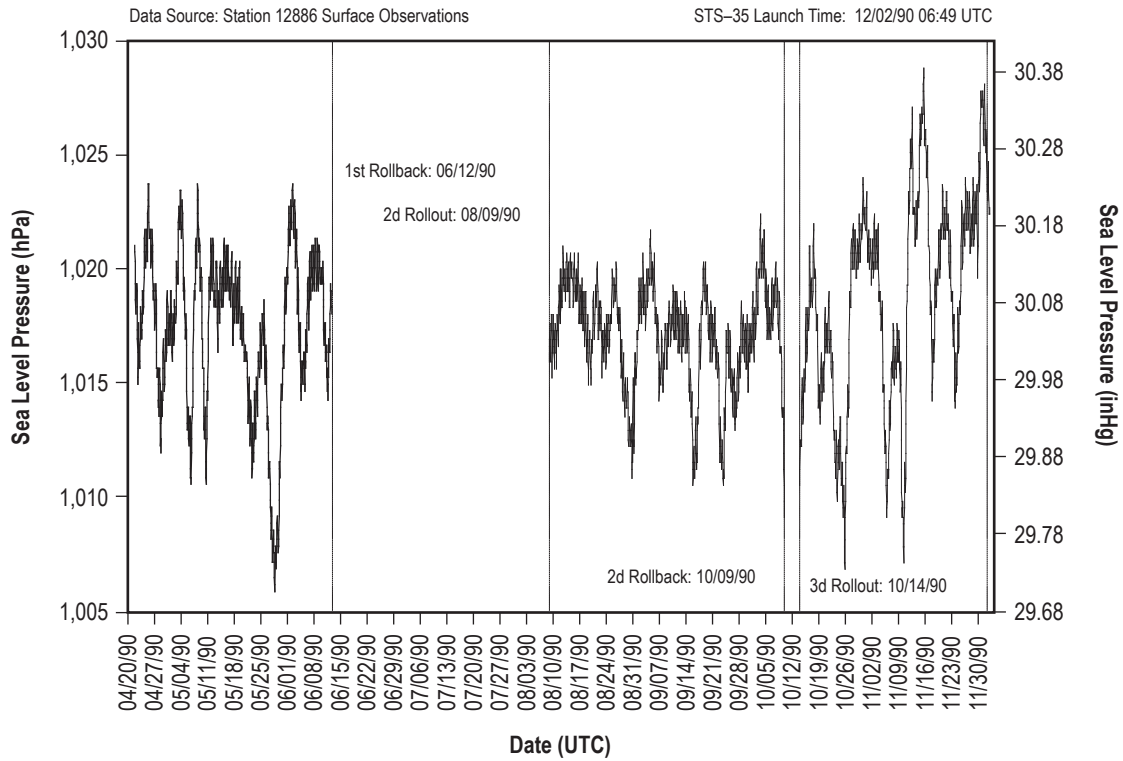


Figure 233. STS-35 hourly sea level pressure.

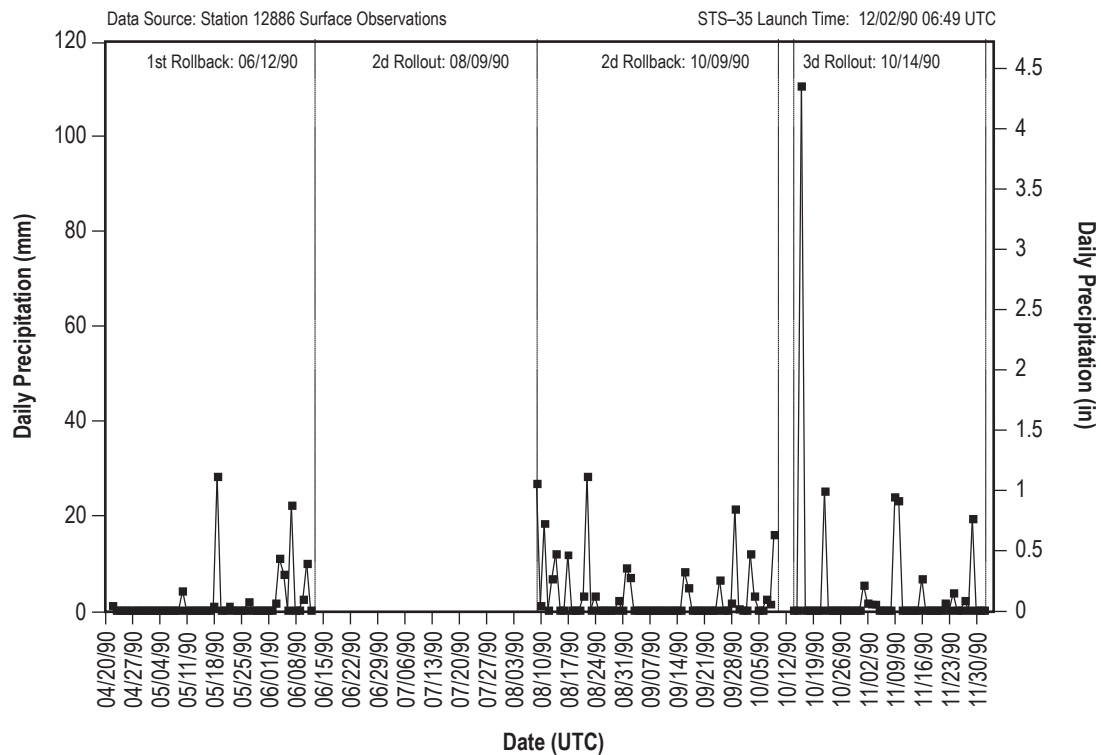


Figure 234. STS-35 daily precipitation totals.

## 5.39 STS-37

STS-37 was the eighth mission for *Atlantis* (OV-104). It rolled out to pad 39B on March 15, 1991. STS-37 was exposed on the pad for 22 days and launched on April 5, 1991, at 14:23 UTC.

### 5.39.1 STS-37 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS-37.

### 5.39.2 STS-37 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-37 are shown in table 81. Temperature, relative humidity and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 81. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 81. STS-37 L-0 surface observations.

Temperature	22.8 °C (73 °F)
Relative humidity	84%
Sea level pressure	1,025.6 hPa (30.28 inHg)
Wind speed	5.7 m/s (11 kt) (1-min average)
Wind direction	74° (1-min average)
Sky condition	2/8 cumulus at 701 m (2,300 ft); 1/8 stratocumulus at 1,280 m (4,200 ft); 3/8 altocumulus at 2,438 m (8,000 ft); 5/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	13.9 km (7.5 nmi)

### 5.39.3 STS-37 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 235–240 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS-37 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 82. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 82. STS-37 pad exposure period hourly extremes.

Minimum temperature	10 °C (50 °F)
Maximum temperature	30.6 °C (87 °F)
Minimum relative humidity	38%
Maximum relative humidity	100%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,026.8 hPa (30.32 inHg)
Maximum wind speed and associated wind direction	12.4 m/s (24 kt) 180°
Total precipitation	210.3 mm (8.28 in)

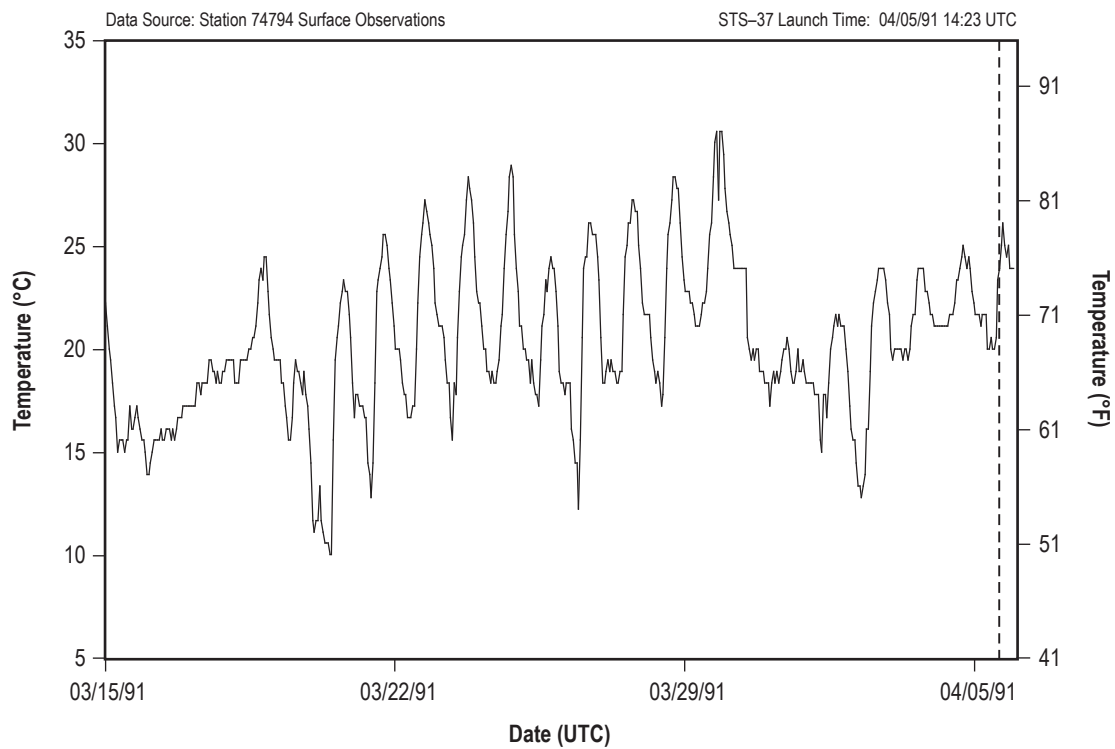


Figure 235. STS-37 hourly surface temperature.

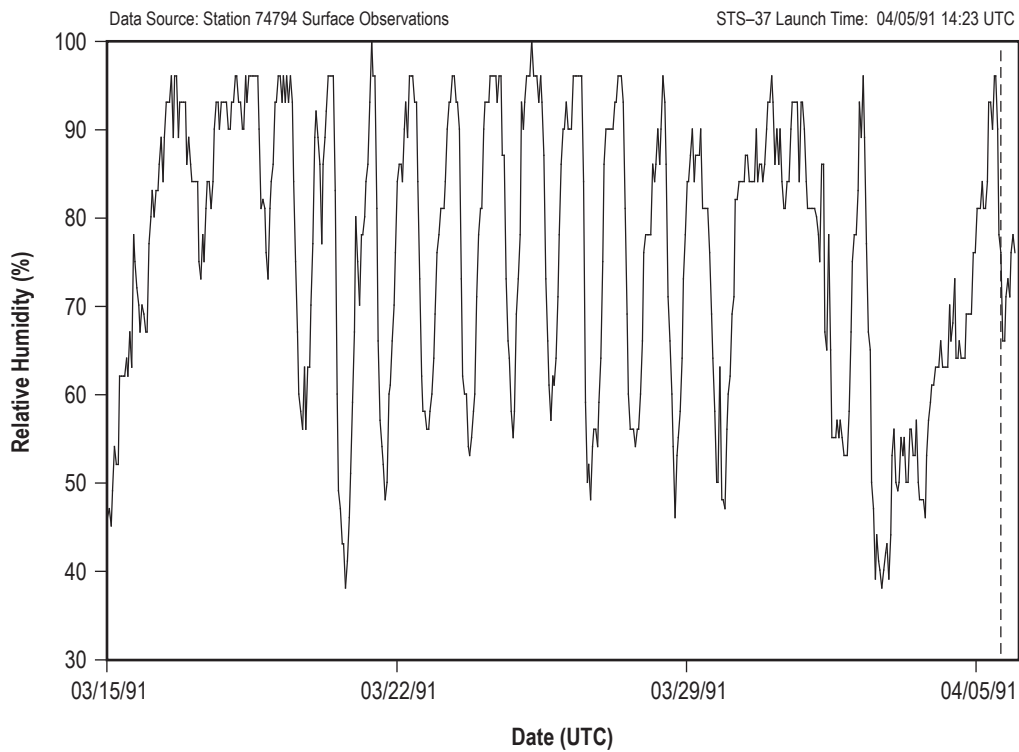


Figure 236. STS-37 hourly surface relative humidity.

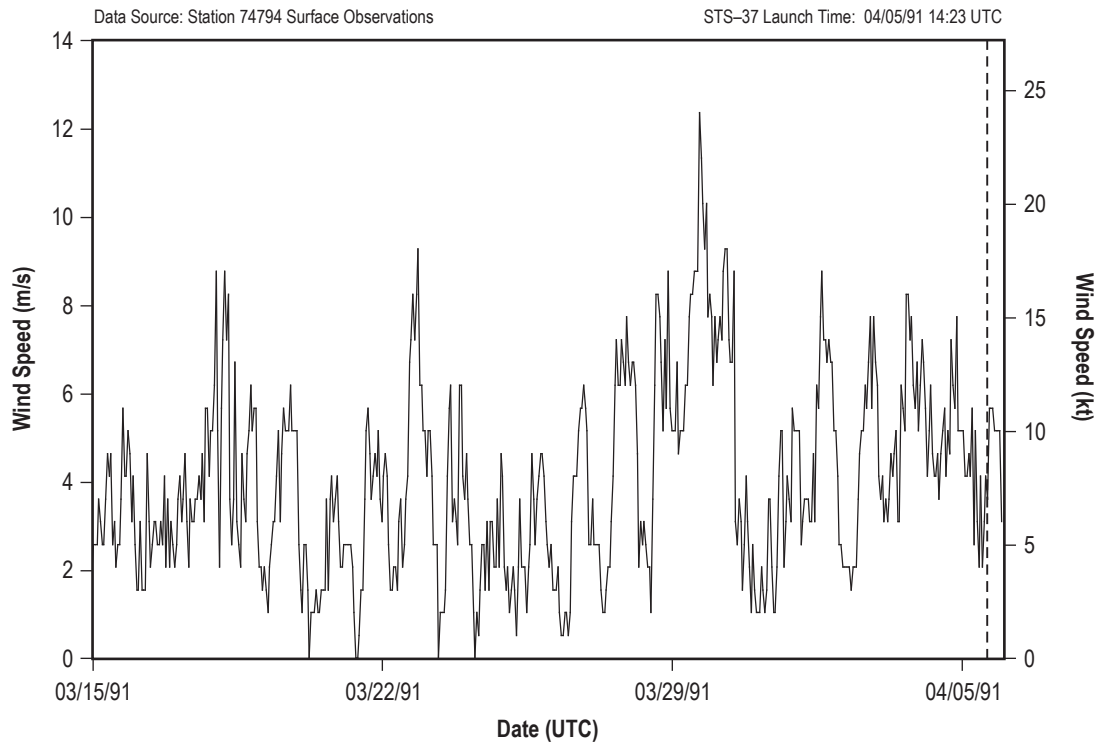


Figure 237. STS-37 hourly surface wind speed.

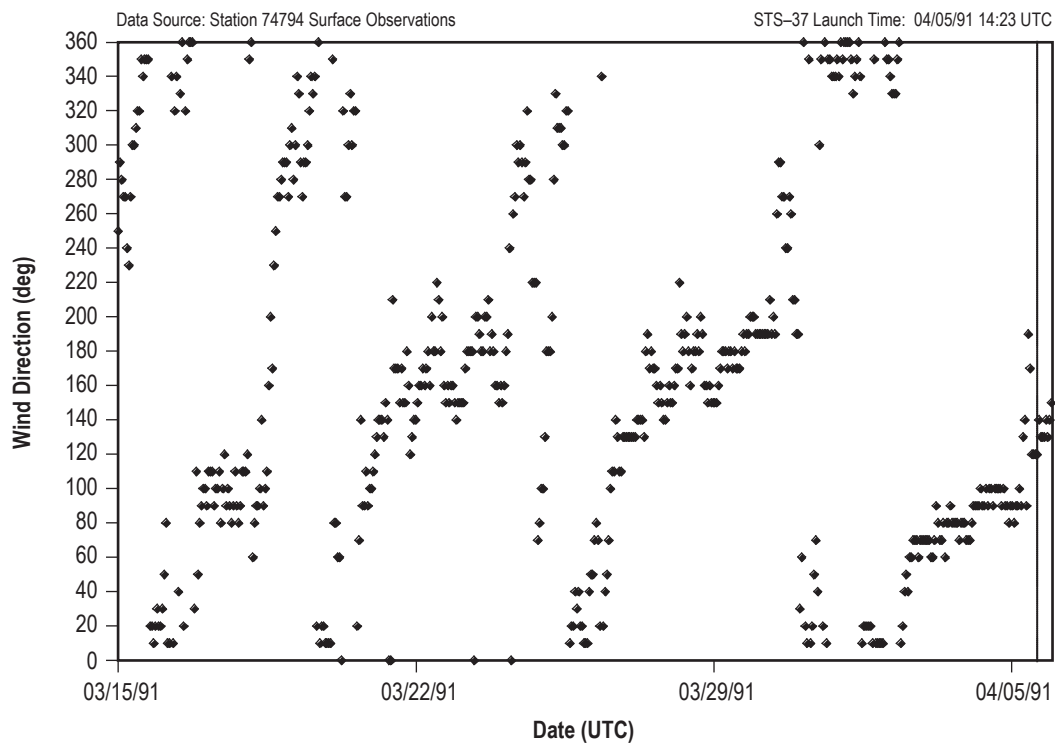


Figure 238. STS-37 hourly surface wind direction.

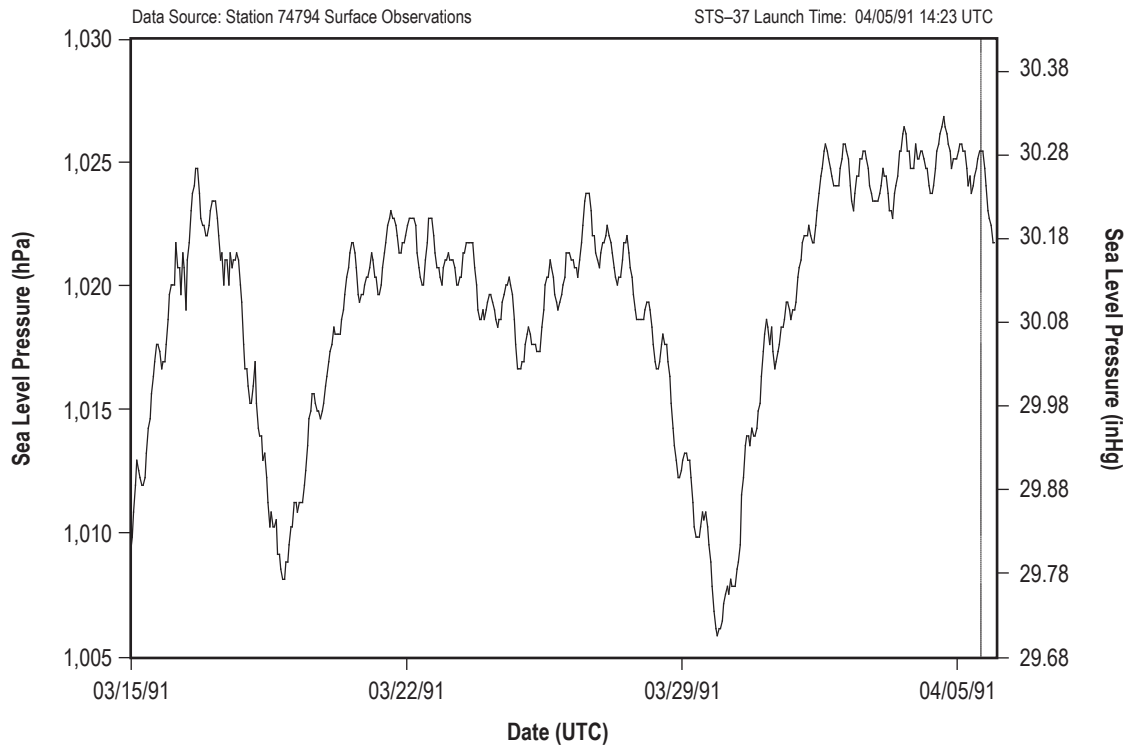


Figure 239. STS-37 hourly sea level pressure.

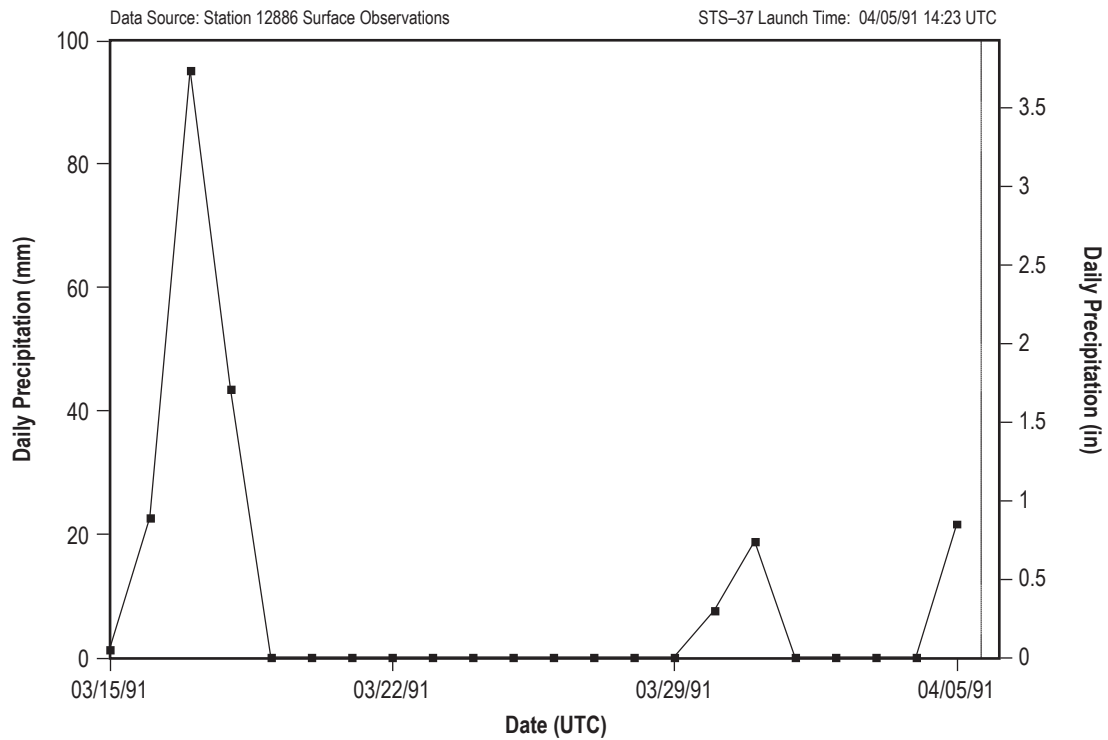


Figure 240. STS-37 daily precipitation totals.

## 5.40 STS-39

STS-39 was the 12th mission for *Discovery* (OV-103). It rolled out to pad 39A the first time on February 15, 1991. It was rolled back from the pad on March 7, 1991. STS-39 rolled out to pad 39A the second time on April 1, 1991. STS-39 was exposed on the pad for a total of 49 days (21 days after the first rollout and 28 days after the second rollout) and launched on April 28, 1991, at 11:33 UTC.

### 5.40.1 STS-39 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS-39.

### 5.40.2 STS-39 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-39 are shown in table 83. Temperature, relative humidity, and pressure were obtained from pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 83. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 83. STS-39 L-0 surface observations.

Temperature	22.2 °C (72 °F)
Relative humidity	95%
Sea level pressure	1,014.9 hPa (29.97 inHg)
Wind speed	3.9 m/s (7.6 kt) (1-min average)
Wind direction	191° (1-min average)
Sky condition	1/8 stratus at 366 m (1,200 ft); 4/8 cirrostratus at 6,401 m (21,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.40.3 STS-39 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 241–246 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS-39 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 84. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 84. STS-39 pad exposure period hourly extremes.

Minimum temperature	0.6 °C (33 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	19%
Maximum relative humidity	100%
Minimum sea level pressure	998.6 hPa (29.49 inHg)
Maximum sea level pressure	1,029.8 hPa (30.41 inHg)
Maximum wind speed and associated wind direction	14.9 m/s (29 kt) 180°
Total precipitation	177.3 mm (6.98 in)

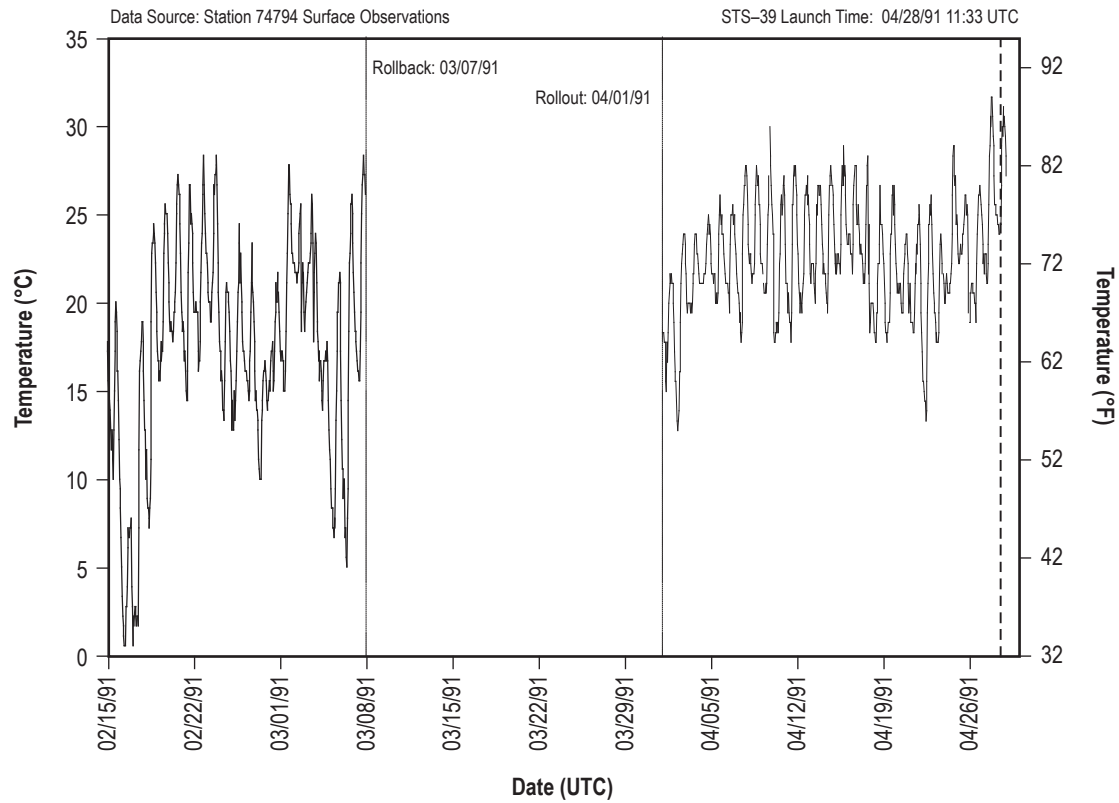


Figure 241. STS-39 hourly surface temperature.

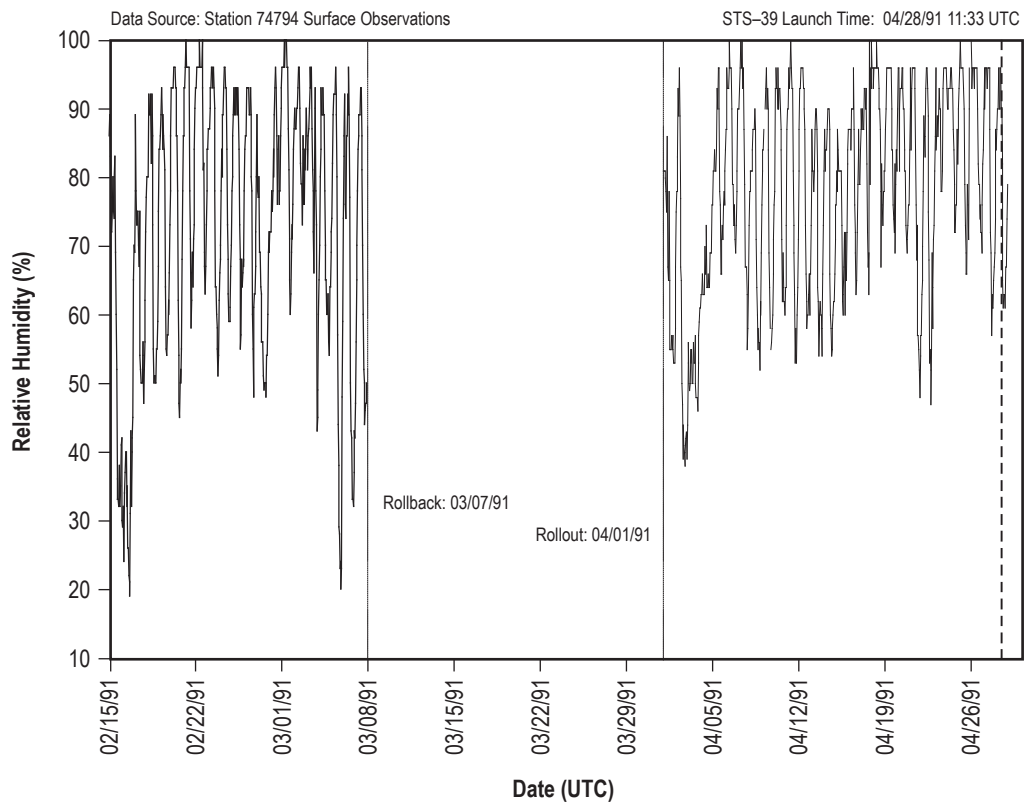


Figure 242. STS-39 hourly surface relative humidity.

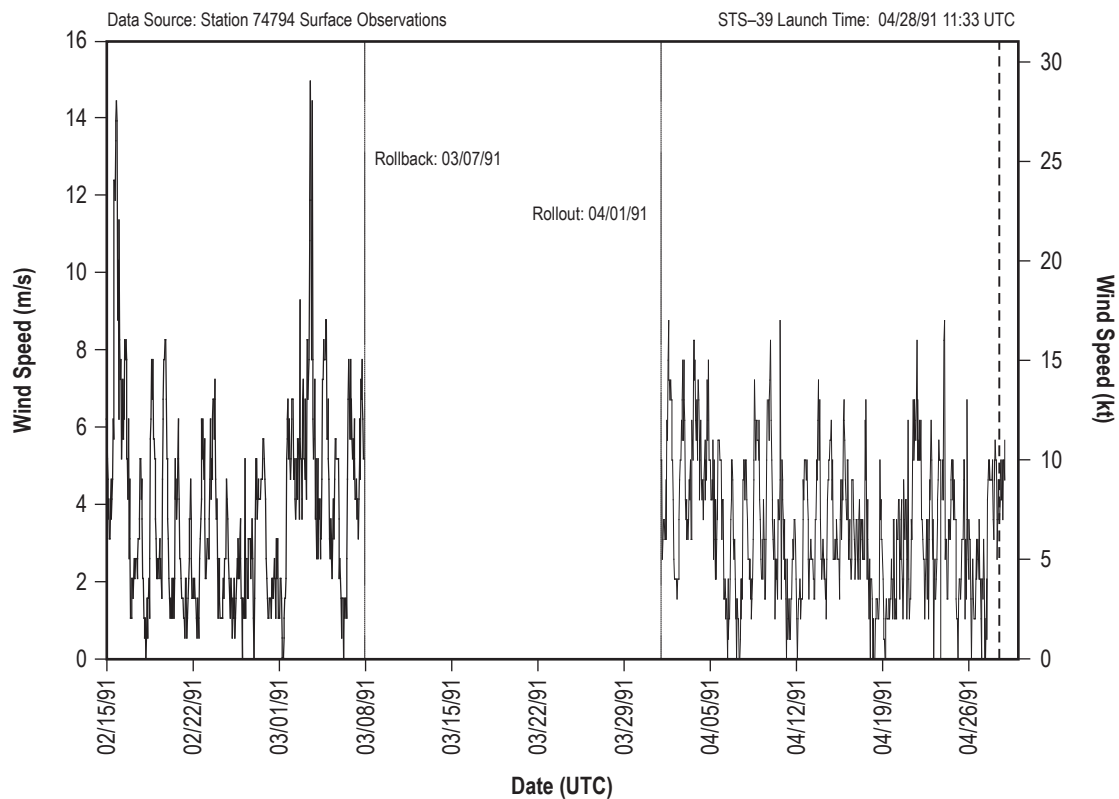


Figure 243. STS-39 hourly surface wind speed.

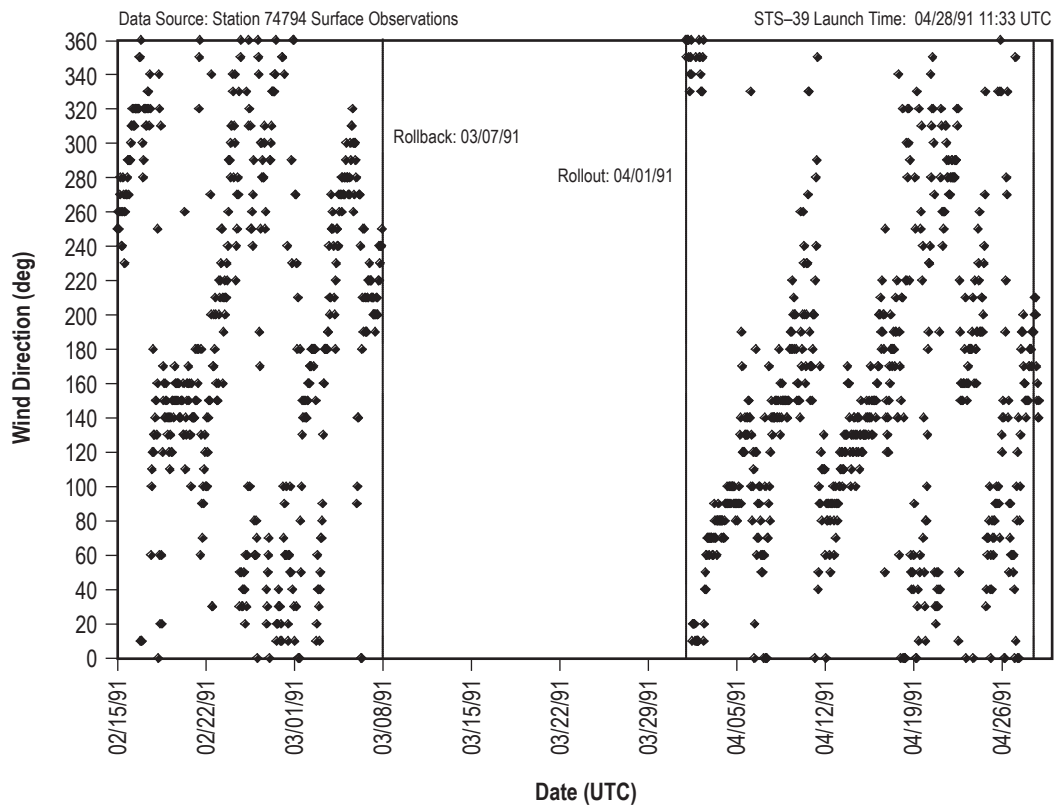


Figure 244. STS-39 hourly surface wind direction.



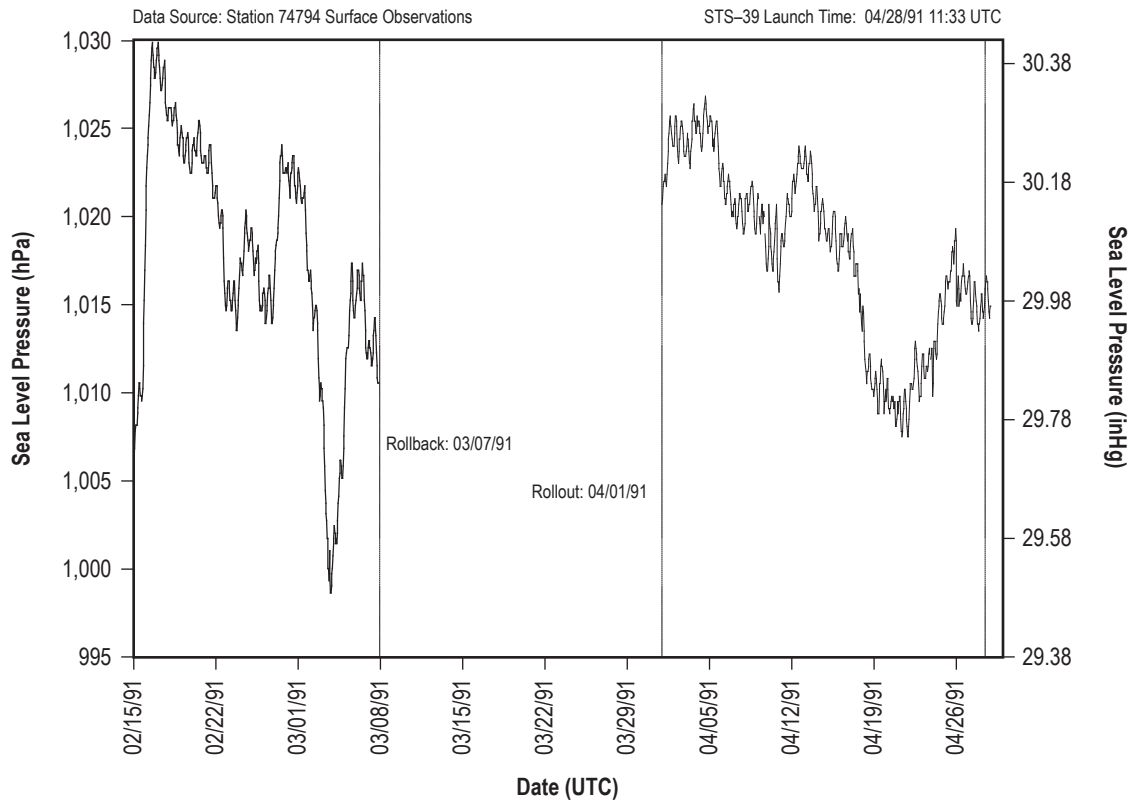


Figure 245. STS-39 hourly sea level pressure.

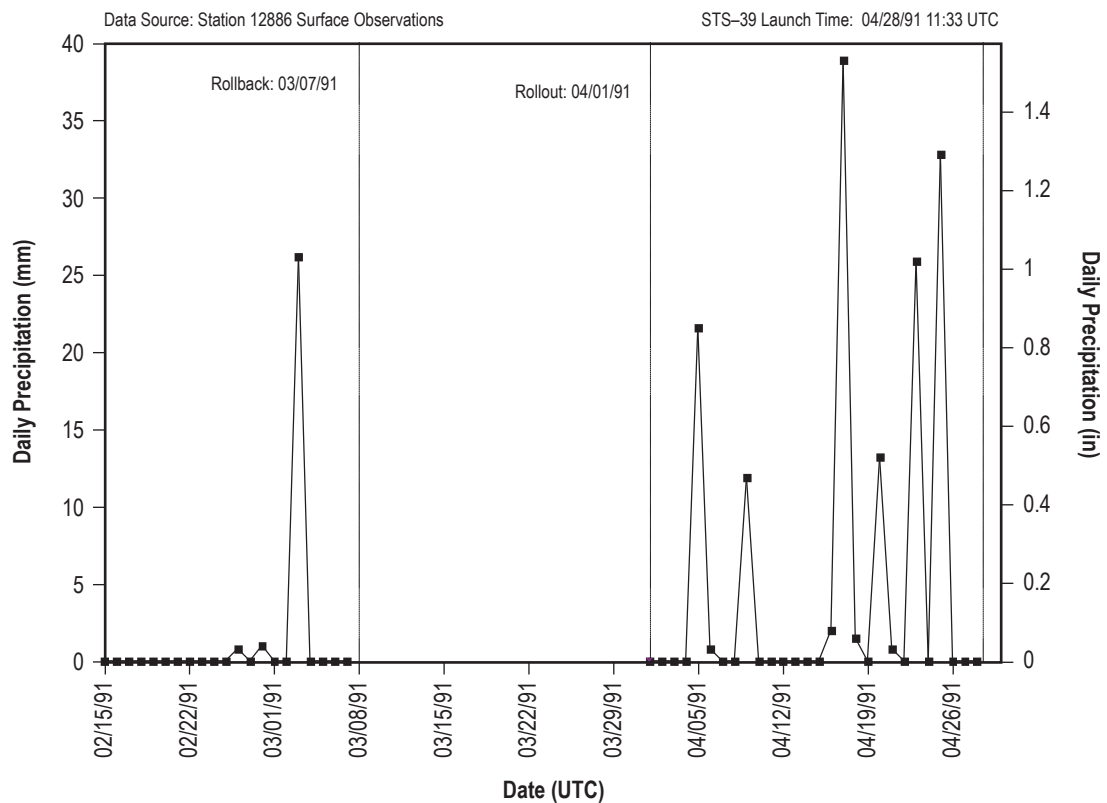


Figure 246. STS-39 daily precipitation totals.

## 5.41 STS–40

STS–40 was the 11th mission for *Columbia* (OV–102). It rolled out to pad 39B on May 2, 1991. STS–40 was exposed on the pad for 35 days and launched on June 5, 1991, at 13:25 UTC.

### 5.41.1 STS–40 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–40.

### 5.41.2 STS–40 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–40 are shown in table 85. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 85.

Table 85. STS–40 L–0 surface observations.

Temperature	23.9 °C (75 °F)
Relative humidity	83%
Sea level pressure	1,020 hPa (30.12 inHg)
Wind speed	2.1 m/s (4 kt) (1-min average)
Wind direction	234° (1-min average)
Sky condition	1/8 stratocumulus at 305 m (1,000 ft); 5/8 altocumulus at 4,267 m (14,000 ft); 7/8 cirrostratus at 6,096 m (20,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.41.3 STS–40 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 247–252 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS–40 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 86. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 86. STS–40 pad exposure period hourly extremes.

Minimum temperature	17.2 °C (63 °F)
Maximum temperature	32.8 °C (91 °F)
Minimum relative humidity	45%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.8 hPa (29.76 inHg)
Maximum sea level pressure	1,023.7 hPa (30.23 inHg)
Maximum wind speed and associated wind direction	7.7 m/s (15 kt) 280°
Total precipitation	164.6 mm (6.48 in)

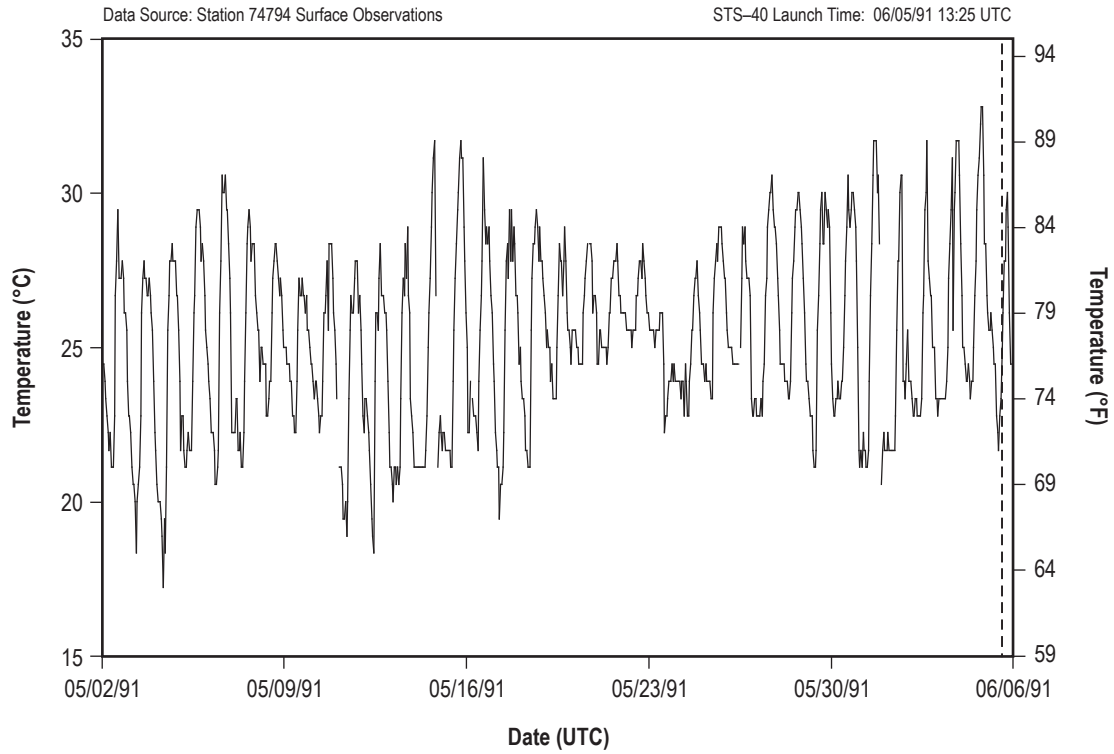


Figure 247. STS-40 hourly surface temperature.

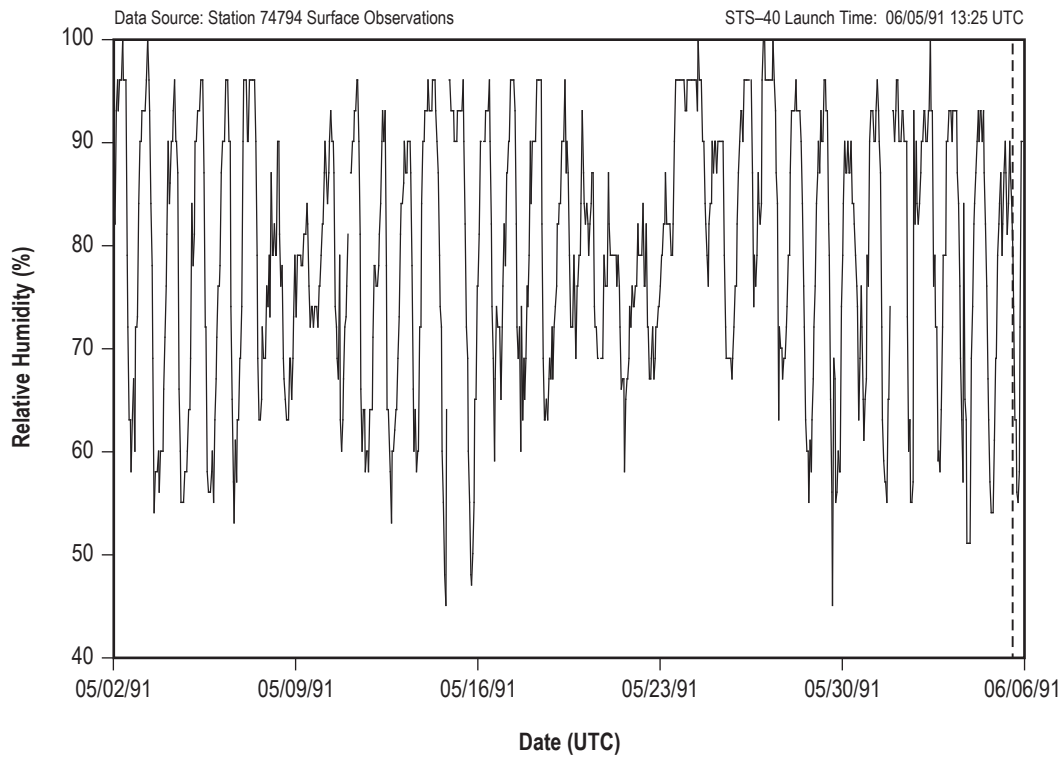


Figure 248. STS-40 hourly surface relative humidity.

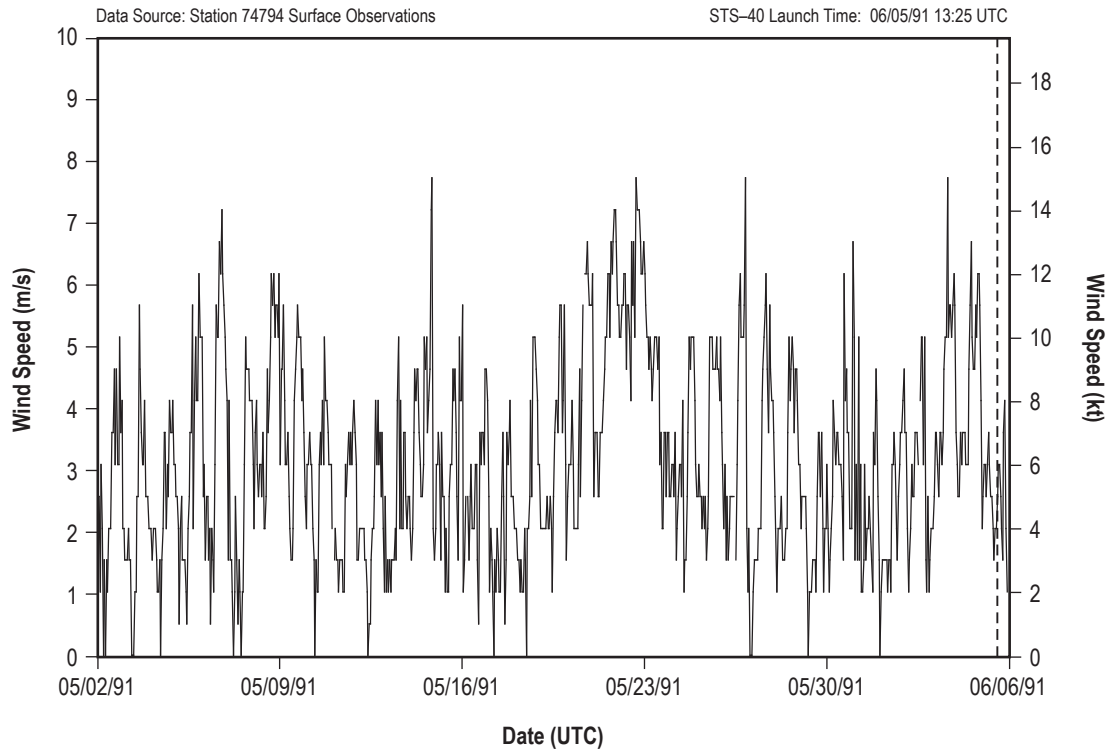


Figure 249. STS-40 hourly surface wind speed.

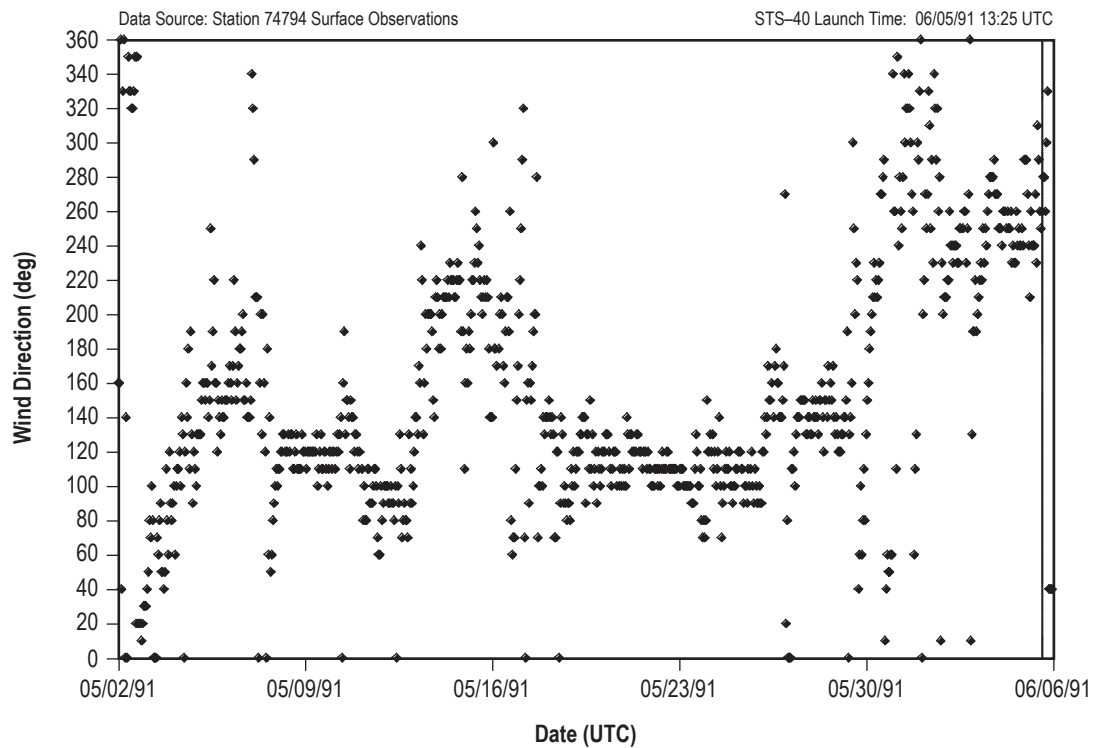


Figure 250. STS-40 hourly surface wind direction.

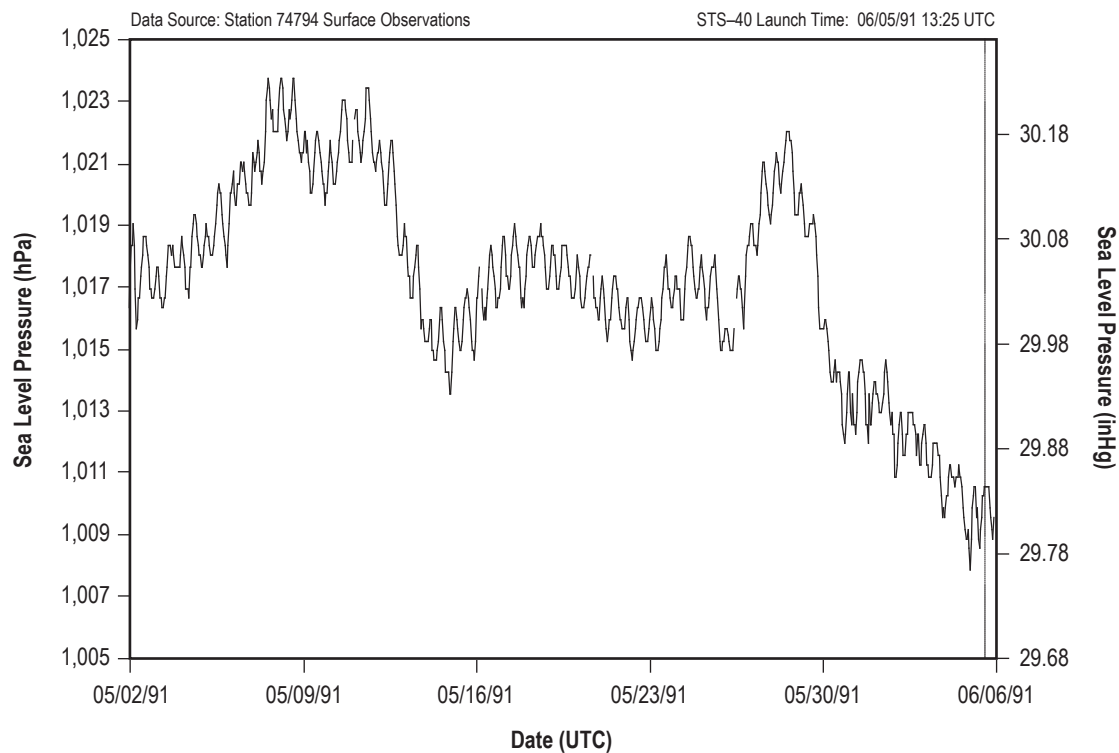


Figure 251. STS-40 hourly sea level pressure.

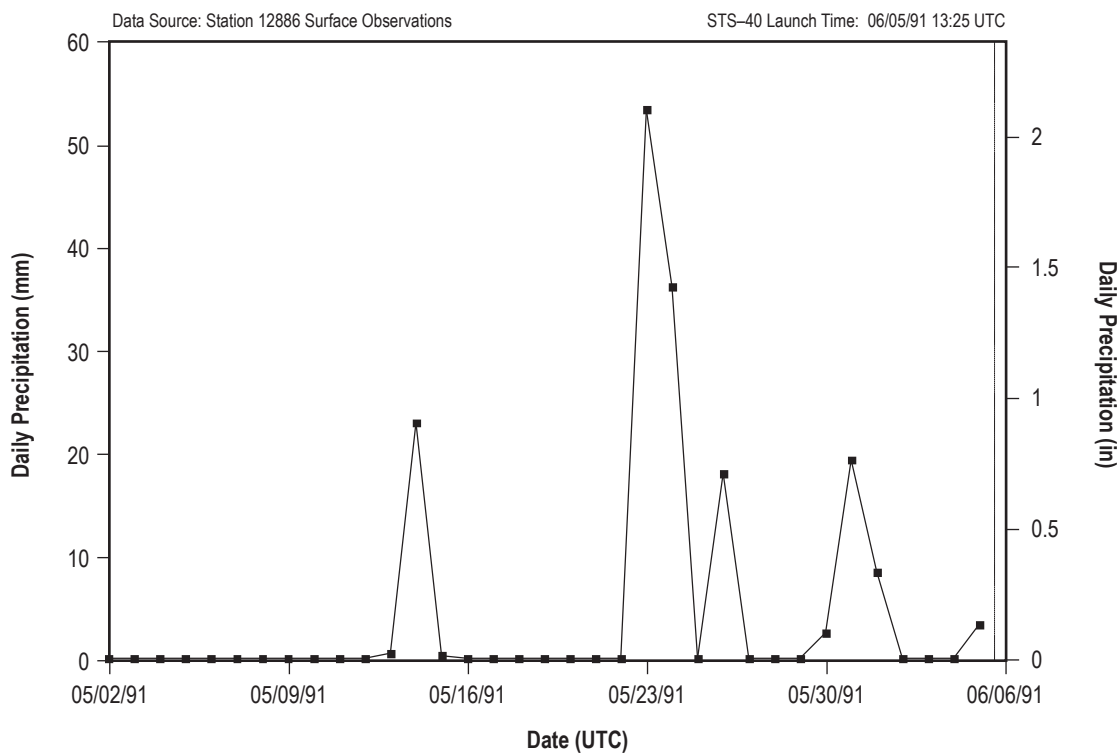


Figure 252. STS-40 daily precipitation totals.

## 5.42 STS-43

STS-43 was the ninth mission for *Atlantis* (OV-104). It rolled out to pad 39A on June 25, 1991. STS-43 was exposed on the pad for 39 days and launched on August 2, 1991, at 15:02 UTC.

### 5.42.1 STS-43 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS-43.

### 5.42.2 STS-43 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-43 are shown in table 87. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 87. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 87. STS-43 L-0 surface observations.

Temperature	27.8 °C (82 °F)
Relative humidity	73%
Sea level pressure	1,018.6 hPa (30.08 inHg)
Wind speed	5.2 m/s (10 kt) (1-min average)
Wind direction	170° (1-min average)
Sky condition	2/8 cirrocumulus at 701 m (2,300 ft); 6/8 cirrostratus at 11,887 m (39,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.42.3 STS-43 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 253–258 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS-43 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 88. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 88. STS-43 pad exposure period hourly extremes.

Minimum temperature	21.7 °C (71 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	48%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.5 hPa (29.9 inHg)
Maximum sea level pressure	1,023.4 hPa (30.22 inHg)
Maximum wind speed and associated wind direction	11.3 m/s (22 kt) 280°
Total precipitation	297.9 mm (11.73 in)

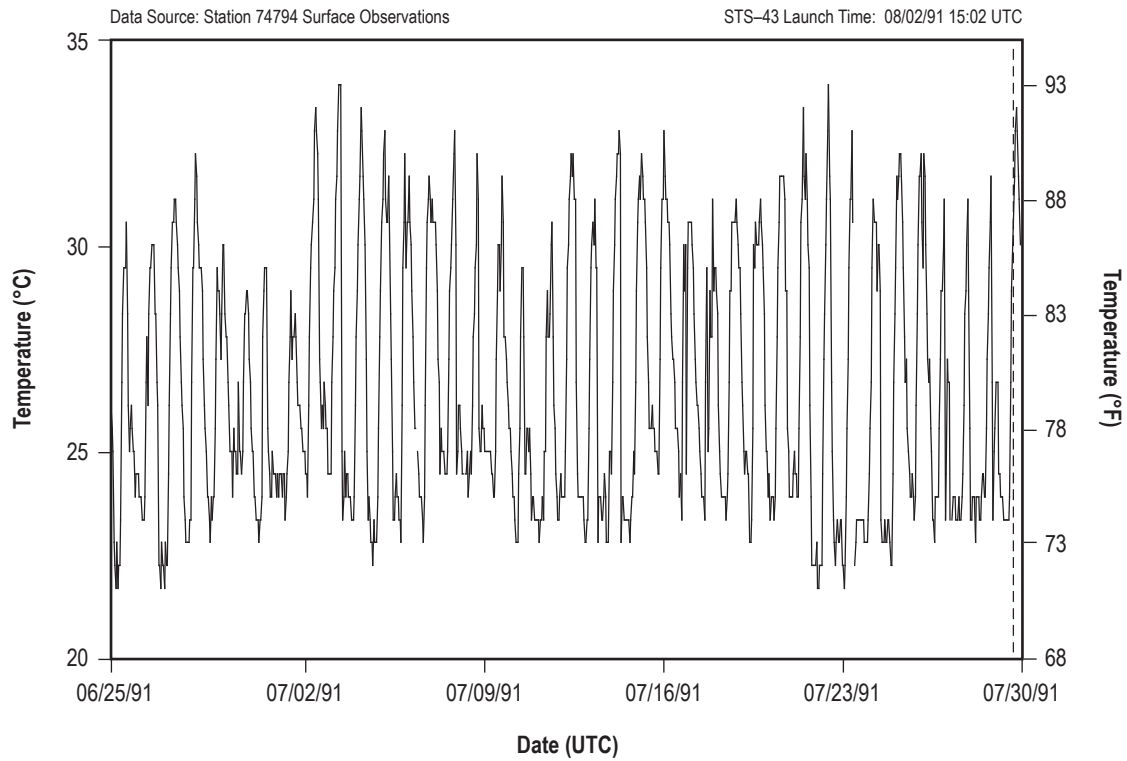


Figure 253. STS-43 hourly surface temperature.

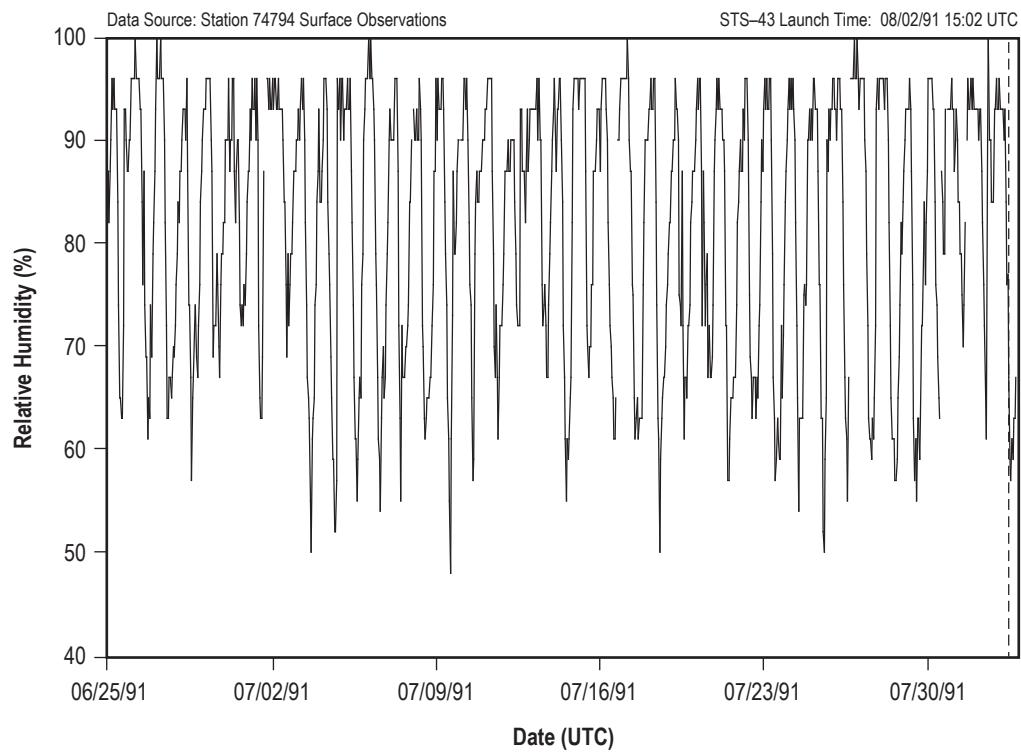


Figure 254. STS-43 hourly surface relative humidity.

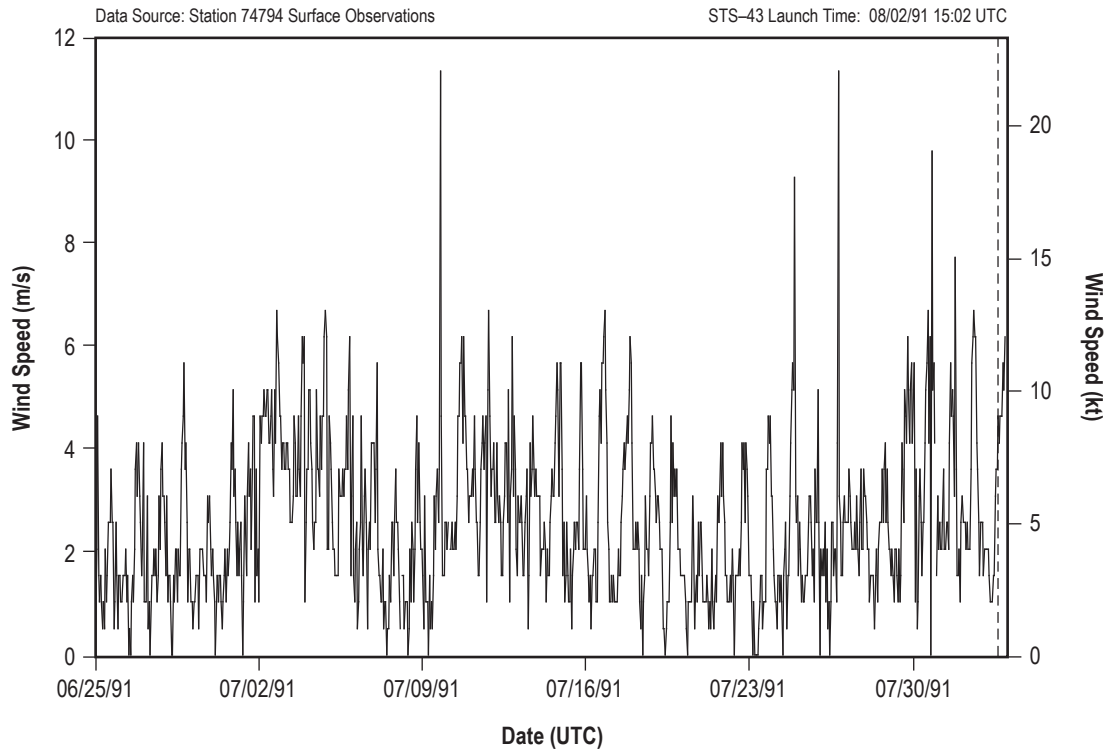


Figure 255. STS-43 hourly surface wind speed.

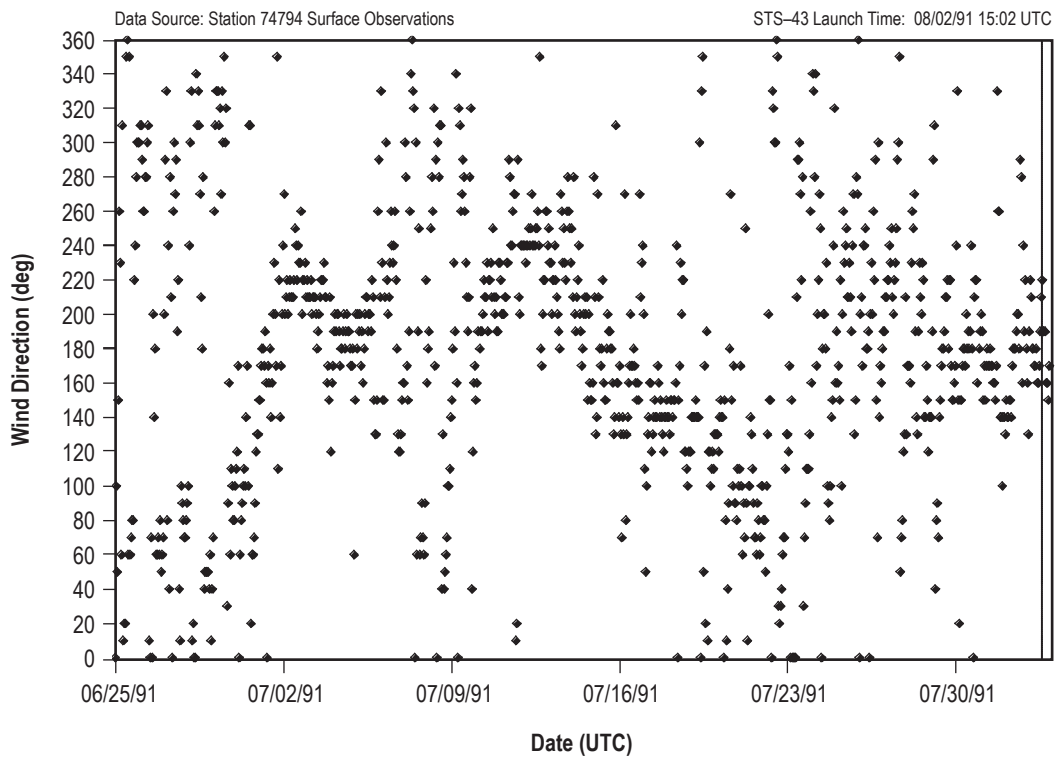


Figure 256. STS-43 hourly surface wind direction.



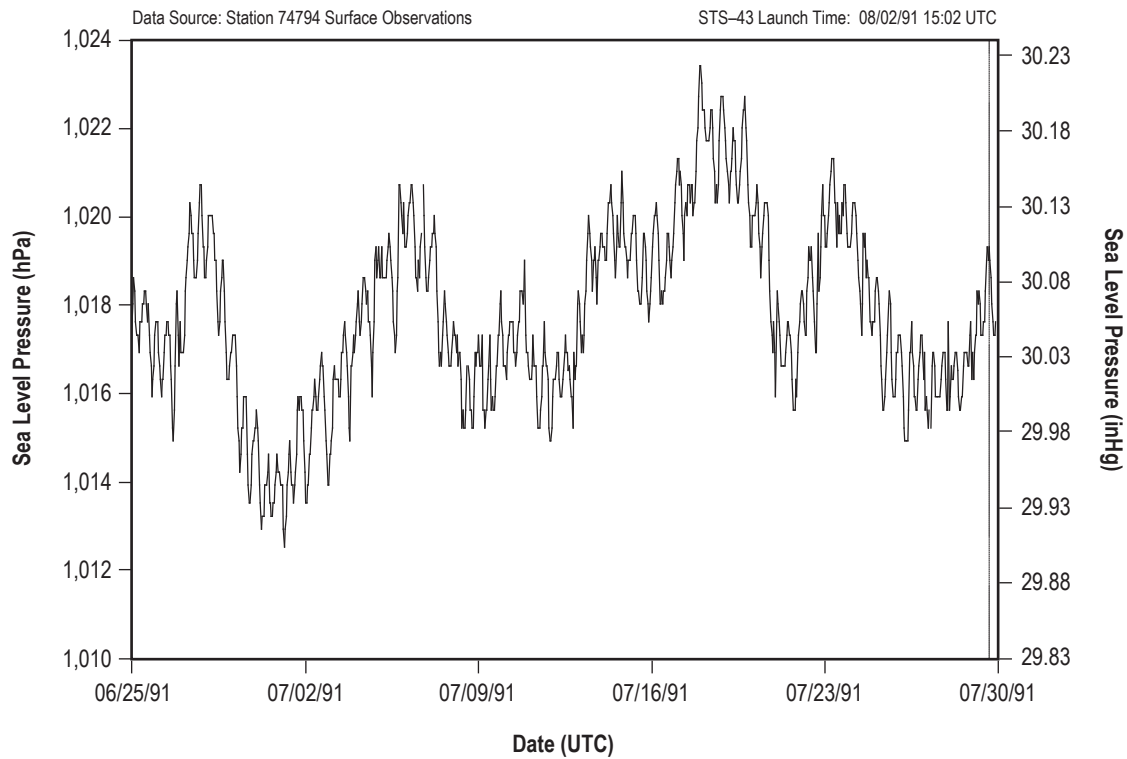


Figure 257. STS-43 hourly sea level pressure.

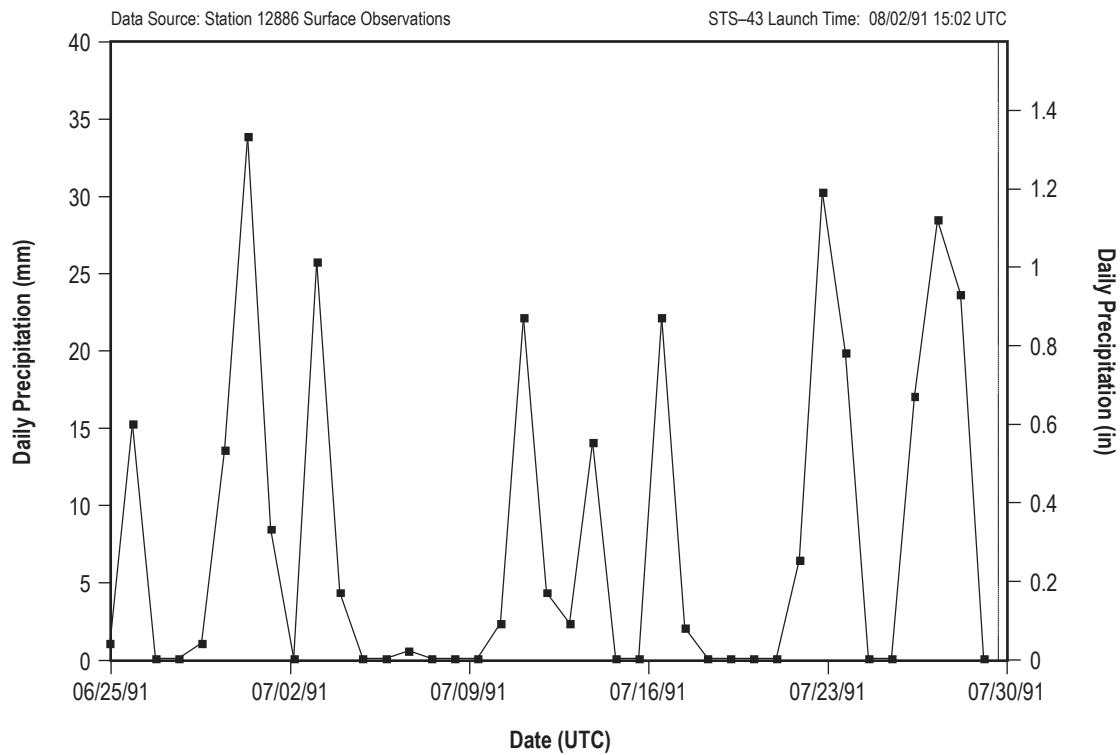


Figure 258. STS-43 daily precipitation totals.

### 5.43 STS–48

STS–48 was the 13th mission for *Discovery* (OV–103). It rolled out to pad 39A on August 12, 1991. STS–48 was exposed on the pad for 32 days and launched on September 12, 1991, at 23:11 UTC.

#### 5.43.1 STS–48 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–48.

#### 5.43.2 STS–48 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–48 are shown in table 89. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 89. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 89. STS–48 L–0 surface observations.

Temperature	25 °C (77 °F)
Relative humidity	71%
Sea level pressure	1,014.6 hPa (29.96 inHg)
Wind speed	3.8 m/s (7.4 kt) (1-min average)
Wind direction	74° (1-min average)
Sky condition	3/8 total cloud cover
Visibility	14.8 km (8 nmi)

#### 5.43.3 STS–48 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 259–264 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS–48 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 90. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 90. STS–48 pad exposure period hourly extremes.

Minimum temperature	21.1 °C (70 °F)
Maximum temperature	34.4 °C (94 °F)
Minimum relative humidity	42%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.9 hPa (29.91 inHg)
Maximum sea level pressure	1,021.3 hPa (30.16 inHg)
Maximum wind speed and associated wind direction	8.2 m/s (16 kt) 240°
Total precipitation	88.1 mm (3.47 in)

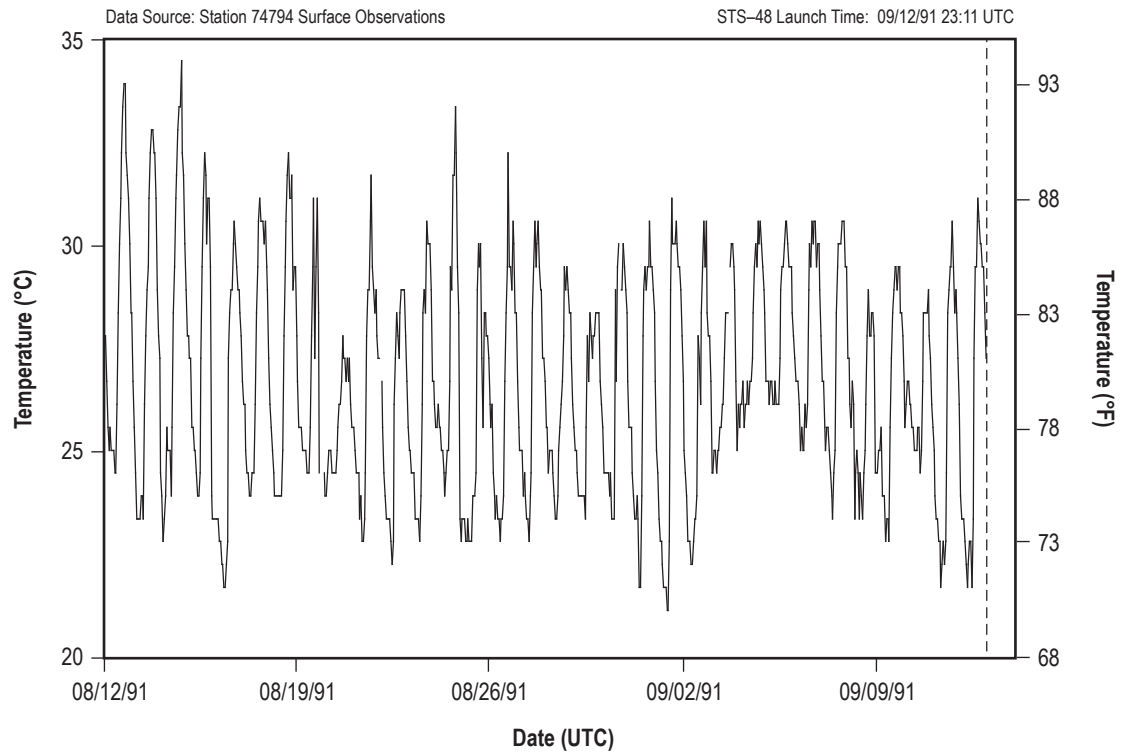


Figure 259. STS-48 hourly surface temperature.

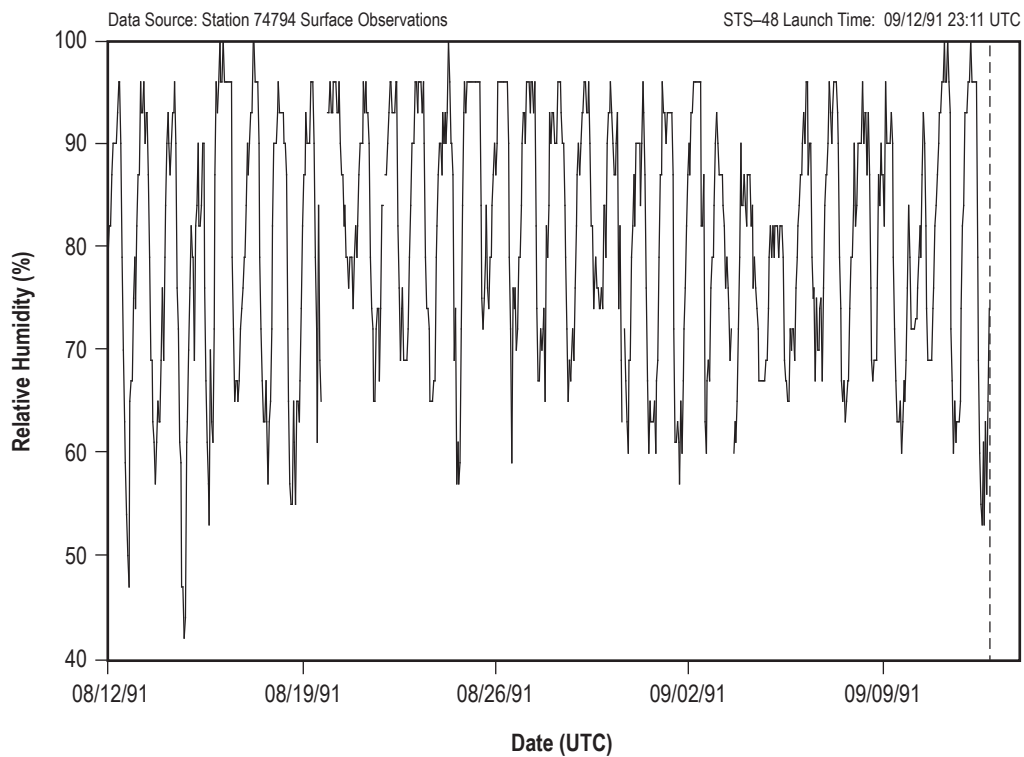


Figure 260. STS-48 hourly surface relative humidity.

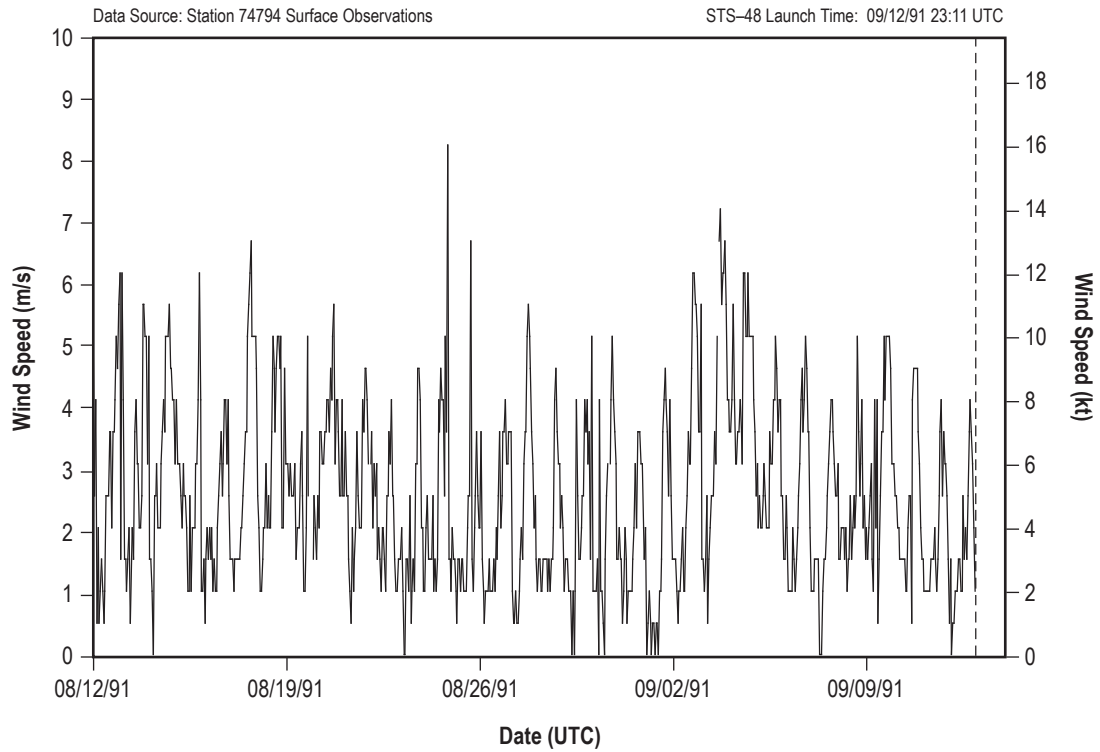


Figure 261. STS-48 hourly surface wind speed.

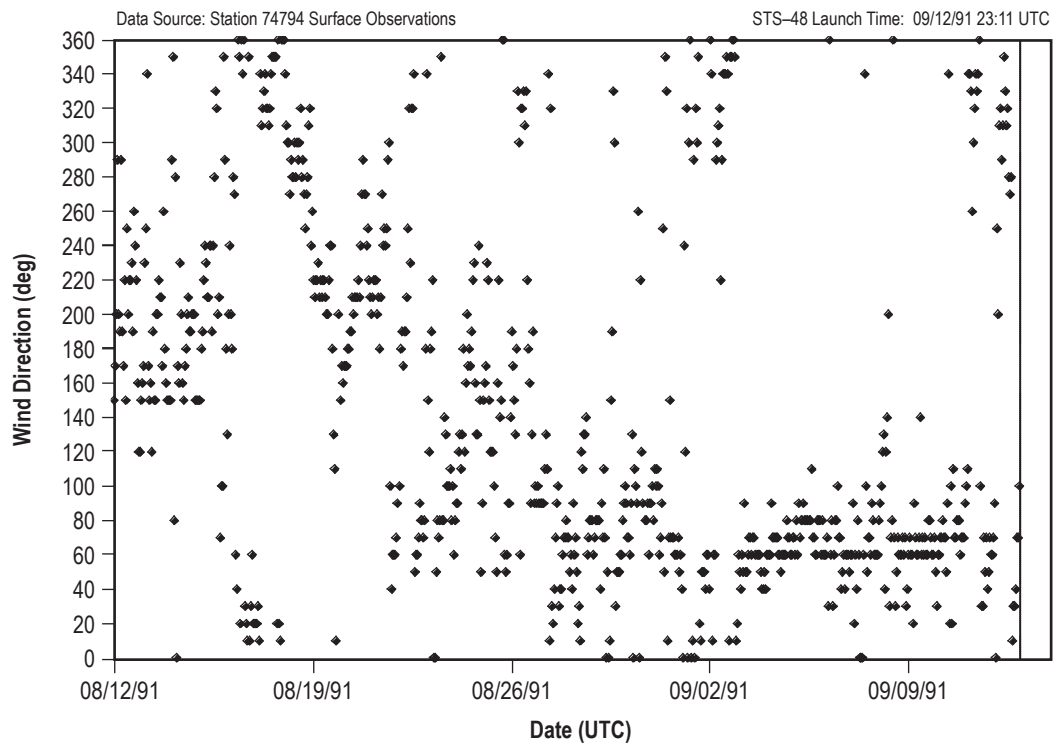


Figure 262. STS-48 hourly surface wind direction.

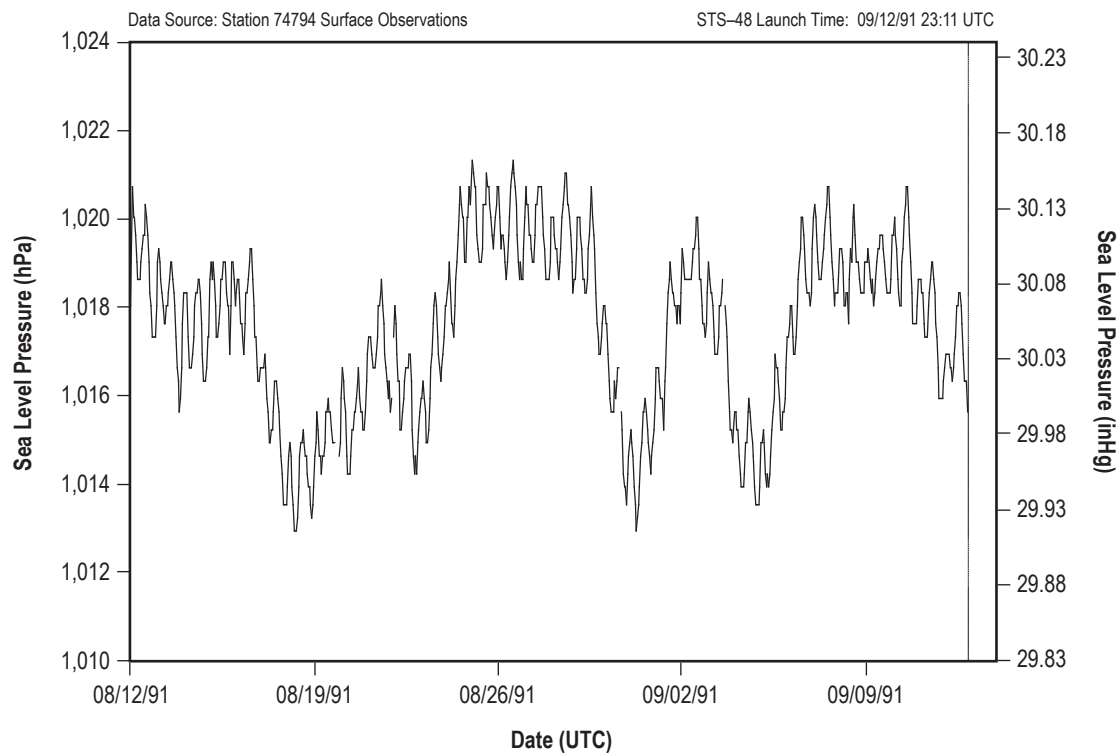


Figure 263. STS-48 hourly sea level pressure.

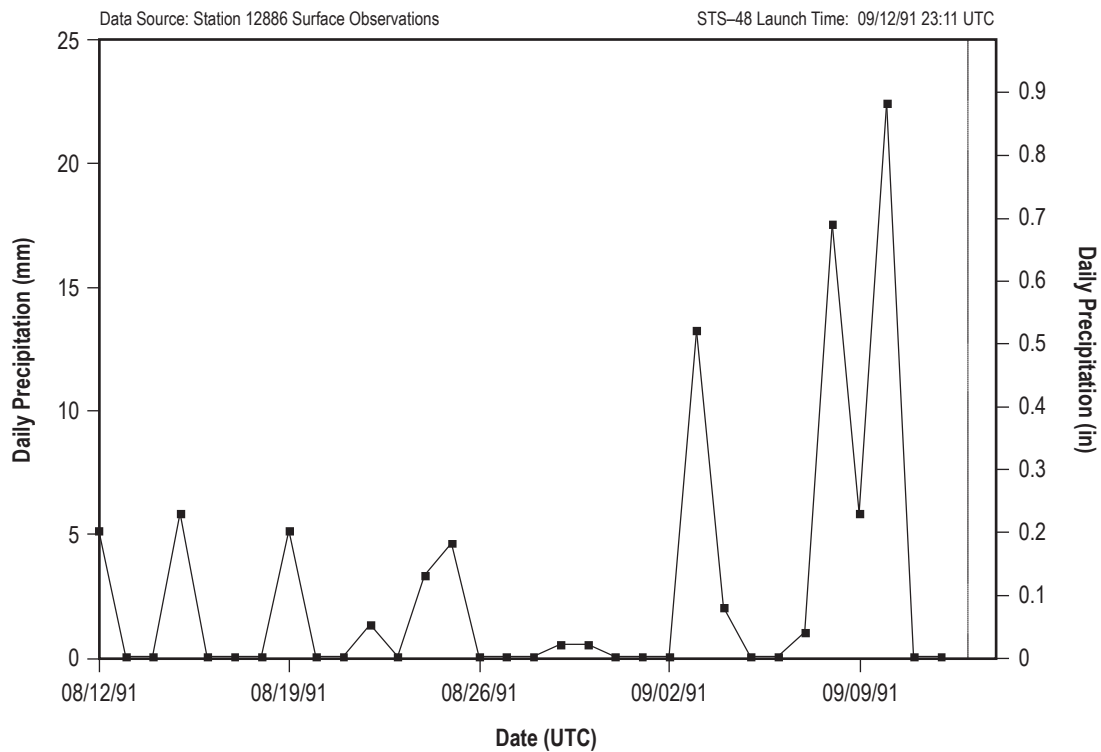


Figure 264. STS-48 daily precipitation totals.

## 5.44 STS–44

STS–44 was the 10th mission for *Atlantis* (OV–104). It rolled out to pad 39A on October 23, 1991. STS–44 was exposed on the pad for 33 days and launched on November 24, 1991, at 23:44 UTC.

### 5.44.1 STS–44 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–44.

### 5.44.2 STS–44 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–44 are shown in table 91. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 91. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 91. STS–44 L–0 surface observations.

Temperature	12.2 °C (54 °F)
Relative humidity	48%
Sea level pressure	1,019.6 hPa (30.11 inHg)
Wind speed	2.6 m/s (5 kt) (1-min average)
Wind direction	301° (1-min average)
Sky condition	1/8 altocumulus at 4,572 m (15,000 ft); 8/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.44.3 STS–44 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 265–270 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation for the STS–44 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 92. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 92. STS–44 pad exposure period hourly extremes.

Minimum temperature	6.7 °C (44 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	31%
Maximum relative humidity	100%
Minimum sea level pressure	1,013.2 hPa (29.93 inHg)
Maximum sea level pressure	1,025.1 hPa (30.27 inHg)
Maximum wind speed and associated wind direction	8.2 m/s (16 kt) 280°
Total precipitation	14.7 mm (0.58 in)

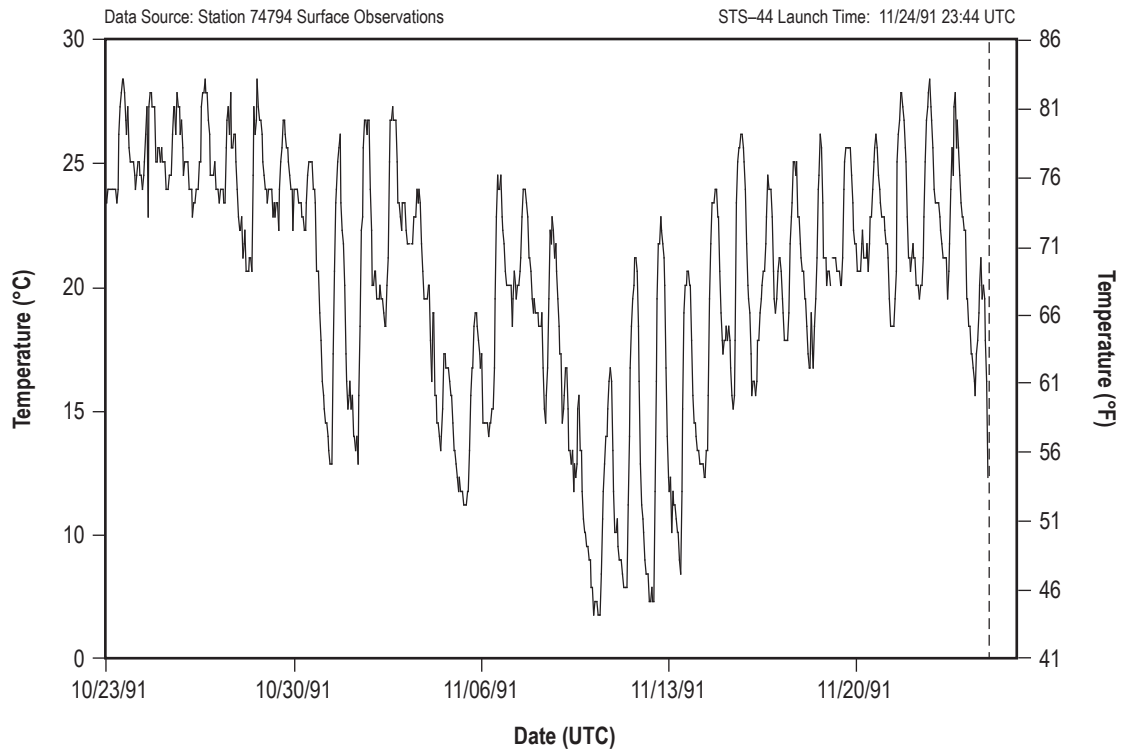


Figure 265. STS-44 hourly surface temperature.

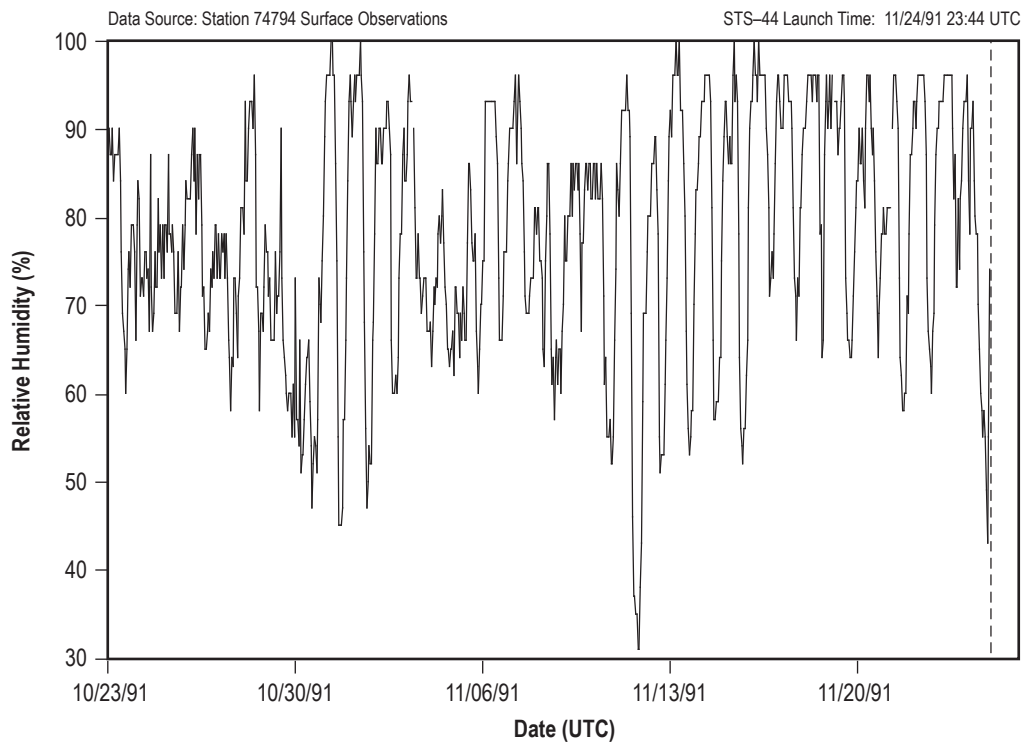


Figure 266. STS-44 hourly surface relative humidity.

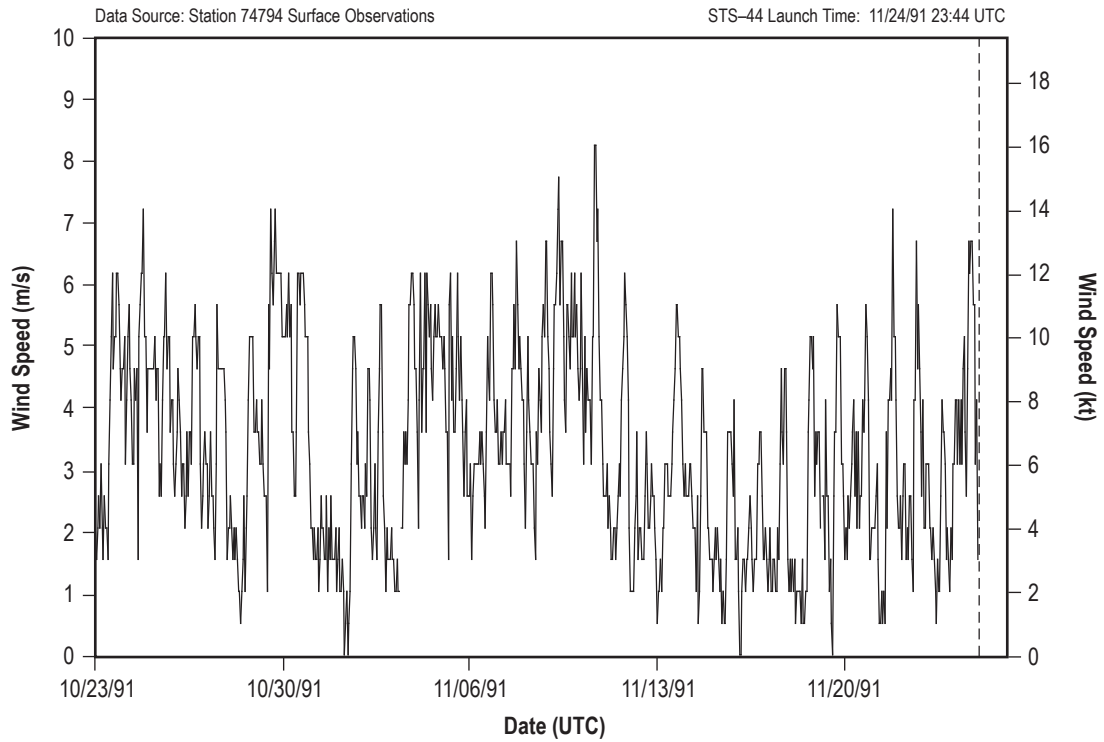


Figure 267. STS-44 hourly surface wind speed.

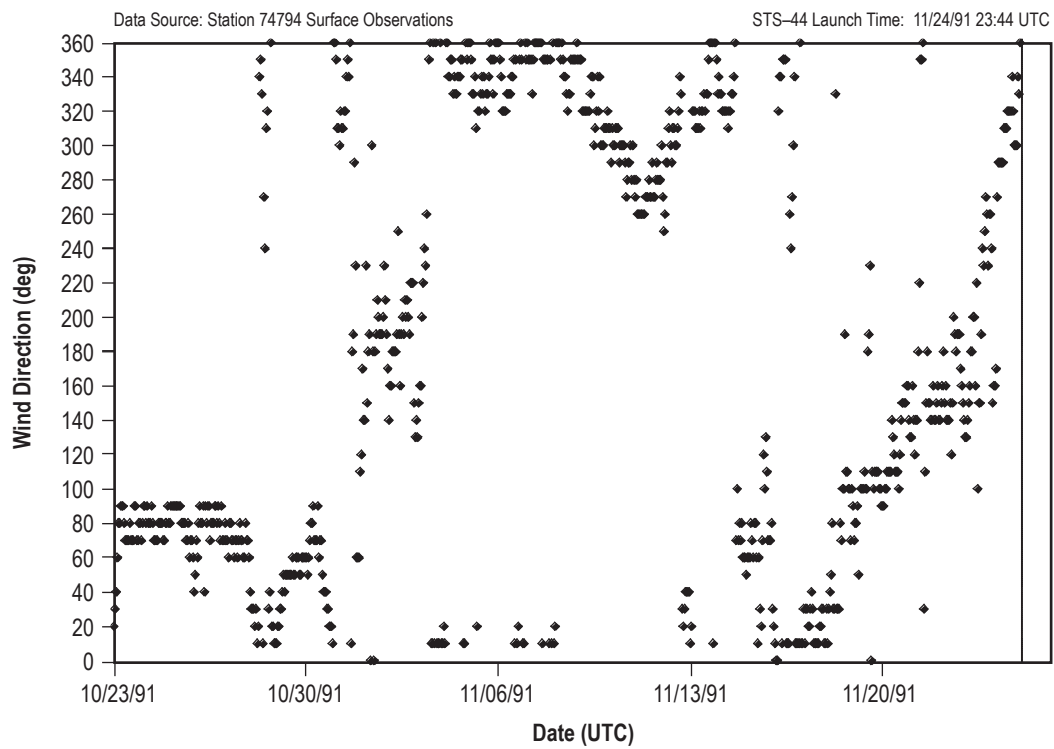


Figure 268. STS-44 hourly surface wind direction.



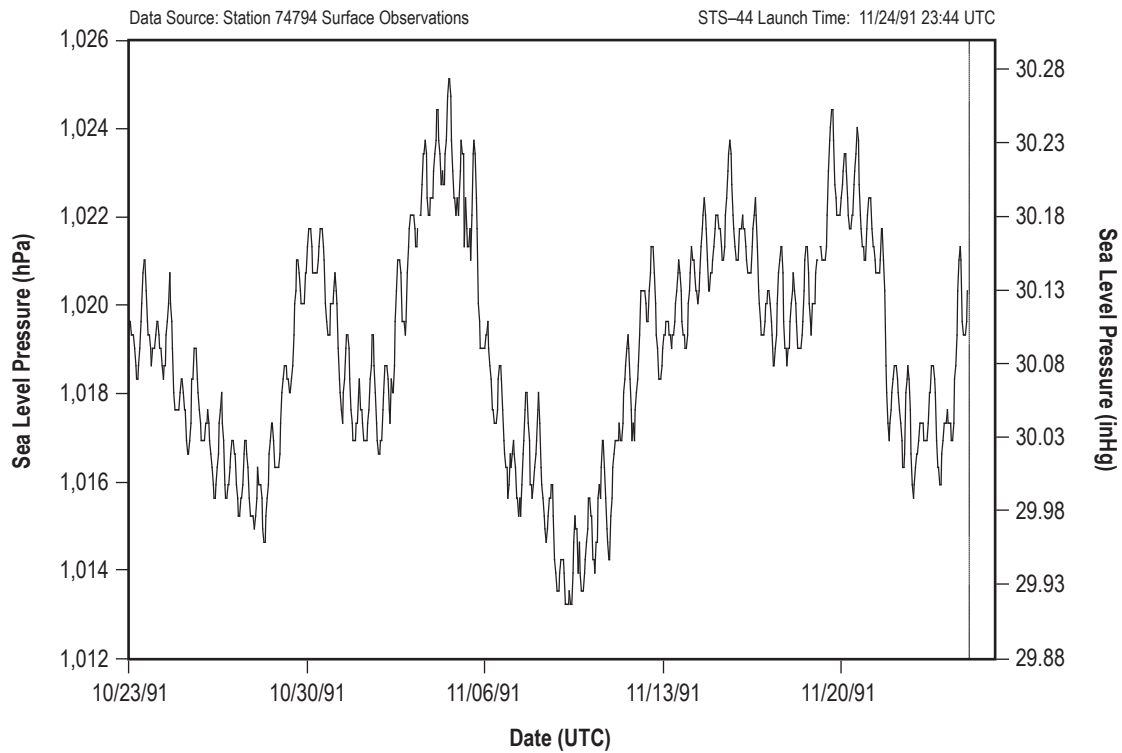


Figure 269. STS-44 hourly sea level pressure.

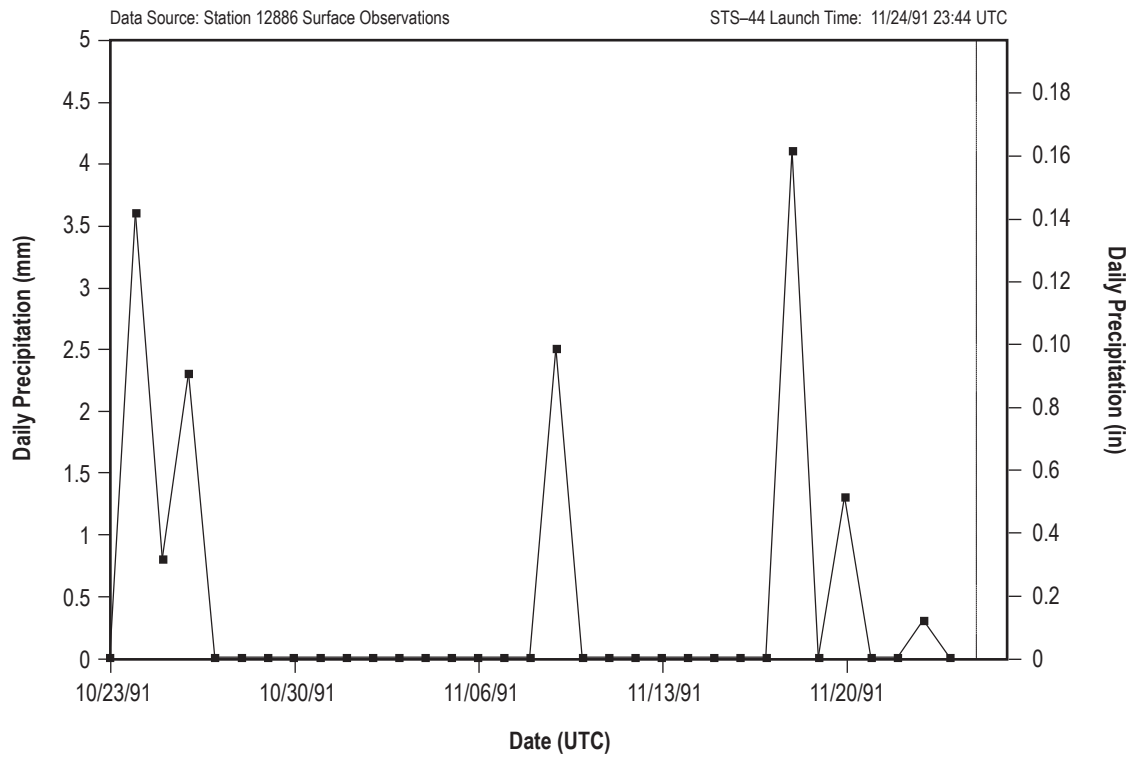


Figure 270. STS-44 daily precipitation totals.

## 5.45 STS–42

STS–42 was the 14th mission for *Discovery* (OV–103). It rolled out to pad 39A on December 19, 1991. STS–42 was exposed on the pad for 35 days and launched on January 22, 1992, at 14:53 UTC.

### 5.45.1 STS–42 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–42.

### 5.45.2 STS–42 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–42 are shown in table 93. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 93. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 93. STS–42 L–0 surface observations.

Temperature	17.2 °C (63 °F)
Relative humidity	86%
Sea level pressure	1,022 hPa (30.18 inHg)
Wind speed	3.1 m/s (6 kt) (1-min average)
Wind direction	38° (1-min average)
Sky condition	1/8 altocumulus at 4,572 m (15,000 ft); 1/8 cirrostratus at 6,096 m (20,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.45.3 STS–42 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 271–276 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–42 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 94. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 94. STS–42 pad exposure period hourly extremes.

Minimum temperature	0 °C (32 °F)
Maximum temperature	26.1 °C (79 °F)
Minimum relative humidity	31%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.1 hPa (29.74 inHg)
Maximum sea level pressure	1,035.9 hPa (30.59 inHg)
Maximum wind speed and associated wind direction	9.3 m/s (18 kt) 40°
Total precipitation	49.8 mm (1.96 in)

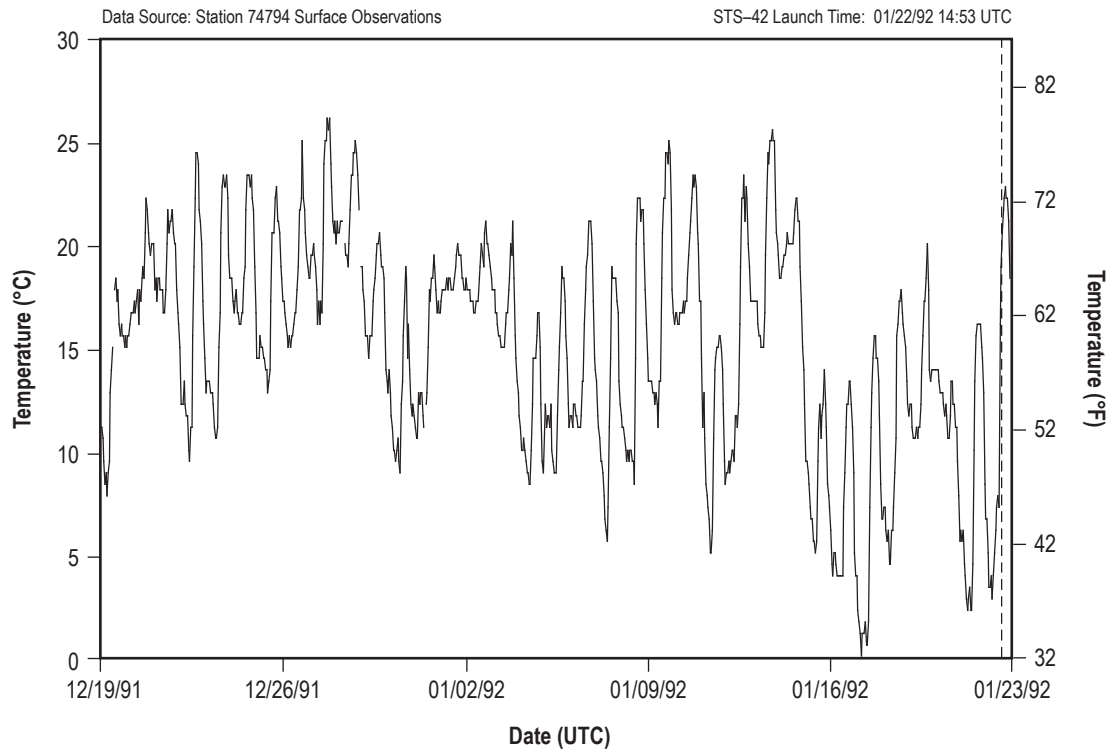


Figure 271. STS-42 hourly surface temperature.

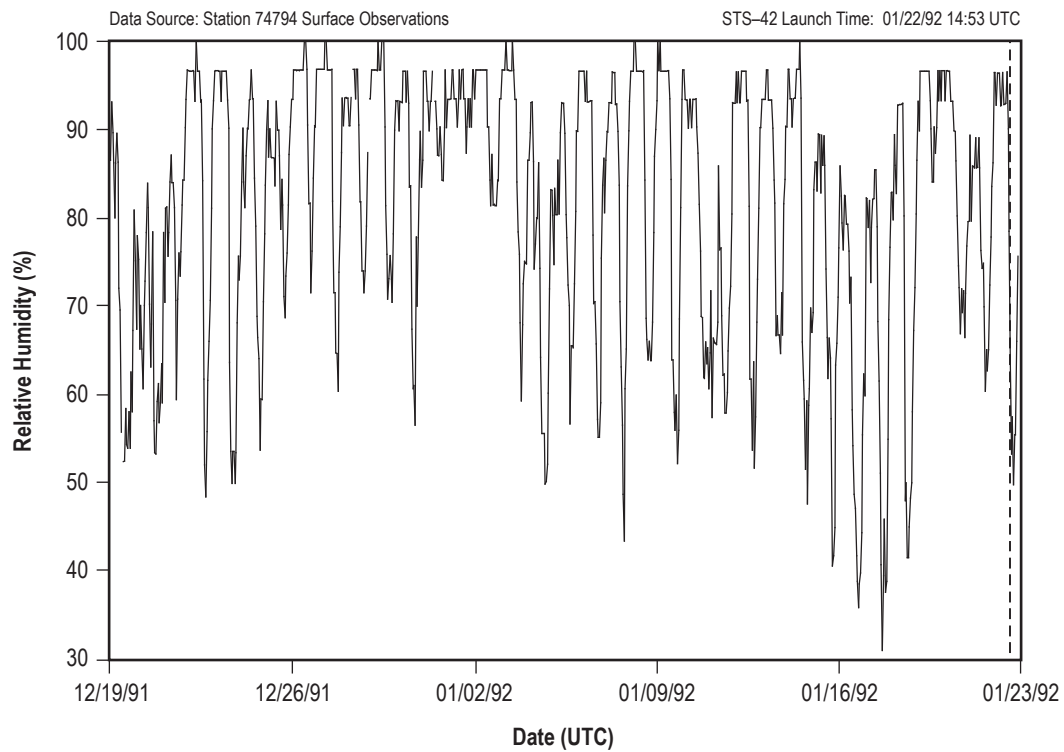


Figure 272. STS-42 hourly surface relative humidity.

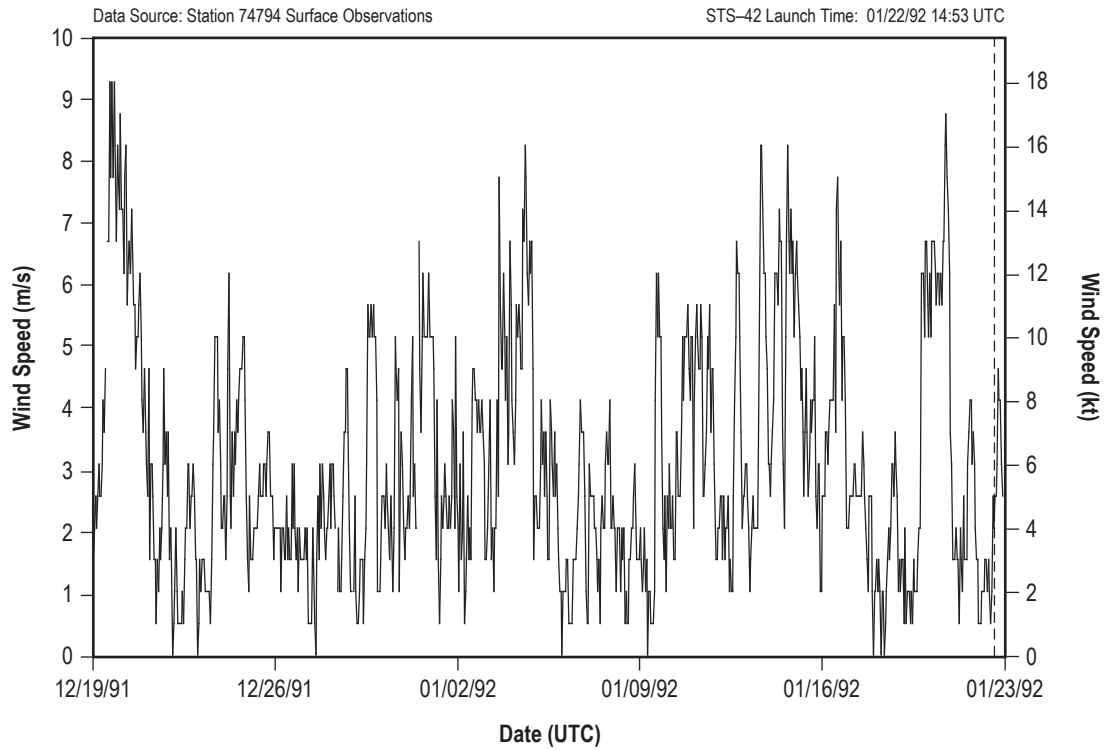


Figure 273. STS-42 hourly surface wind speed.

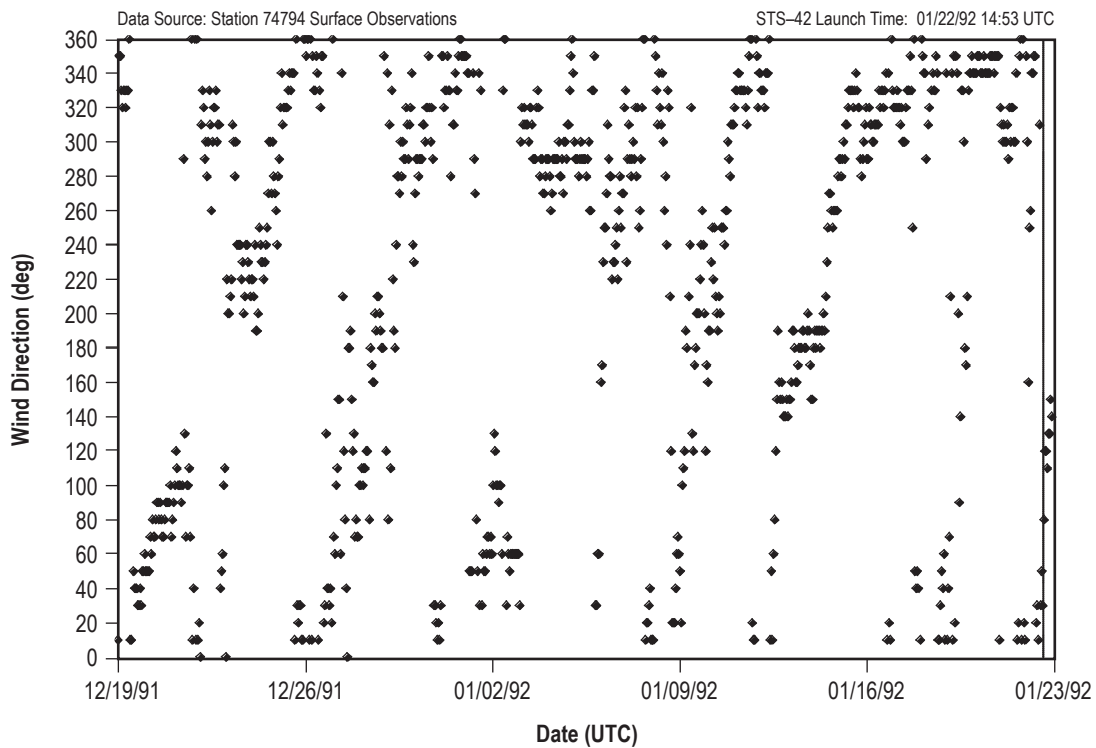


Figure 274. STS-42 hourly surface wind direction.

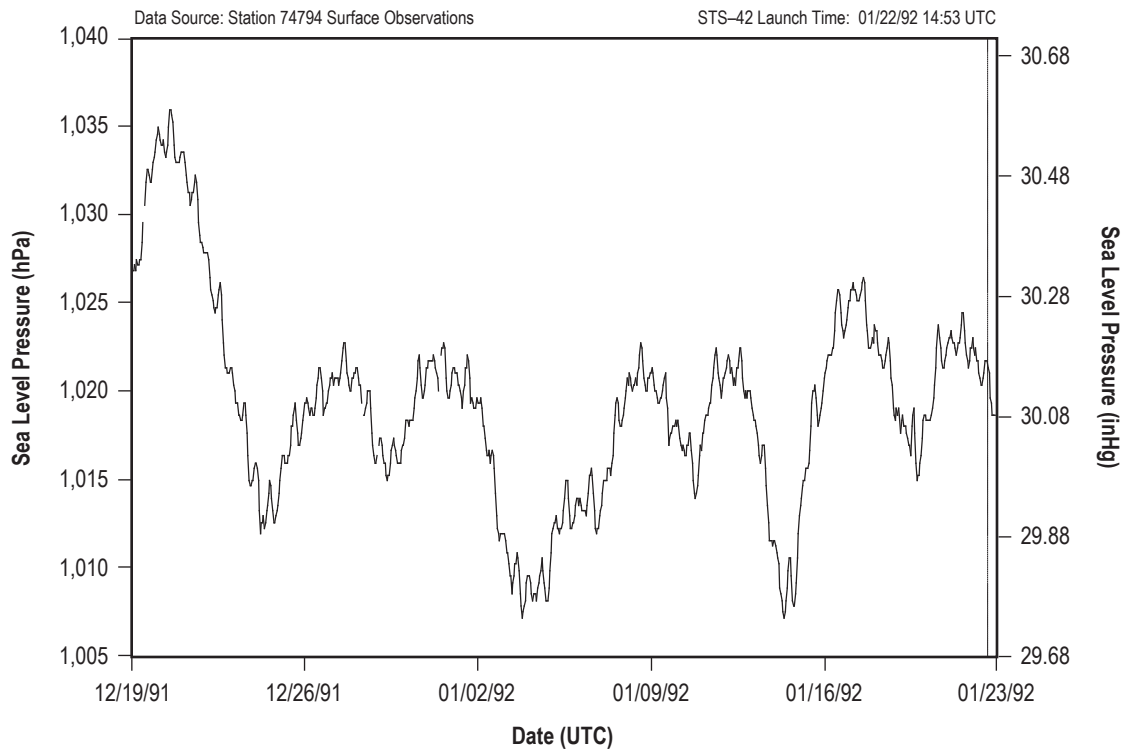


Figure 275. STS-42 hourly sea level pressure.

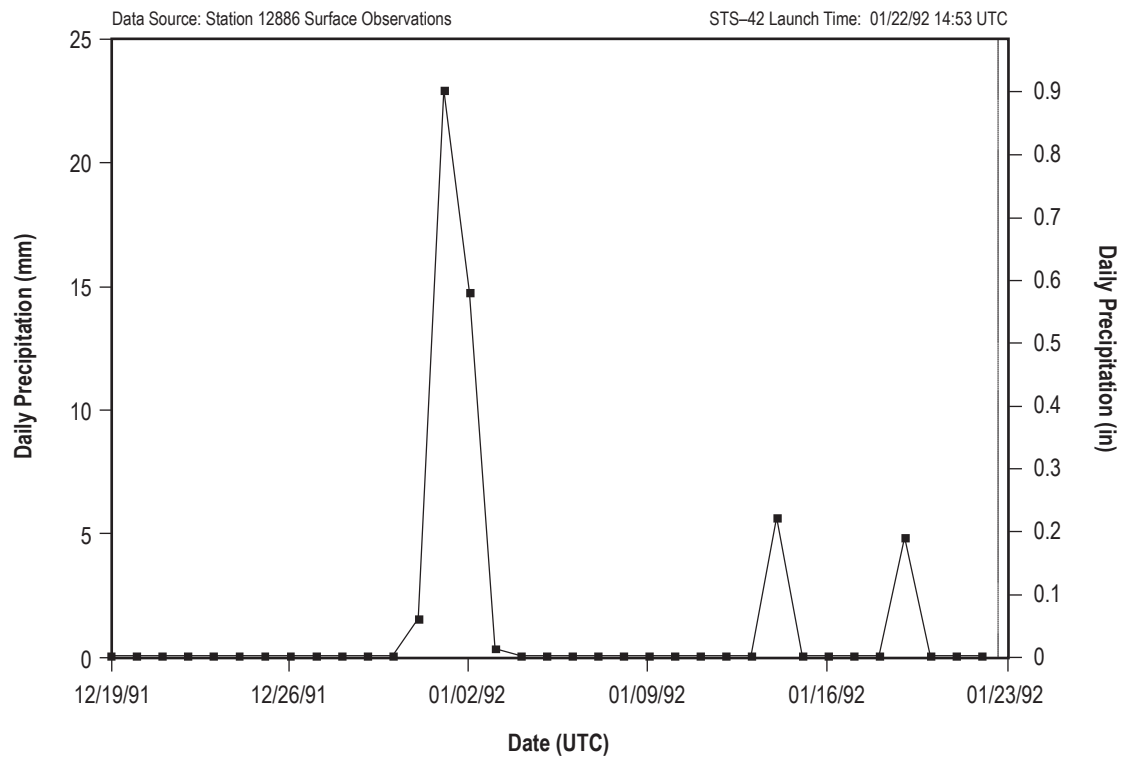


Figure 276. STS-42 daily precipitation totals.

## 5.46 STS–45

STS–45 was the 11th mission for *Atlantis* (OV–104). It rolled out to pad 39A on February 19, 1992. STS–45 was exposed on the pad for 35 days and launched on March 24, 1992, at 13:13 UTC.

### 5.46.1 STS–45 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–45.

### 5.46.2 STS–45 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–45 are shown in table 95. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 95.

Table 95. STS–45 L–0 surface observations.

Temperature	18.9 °C (66 °F)
Relative humidity	72%
Sea level pressure	1,018 hPa (30.06 inHg)
Wind speed	7.2 m/s (14 kt) (1-min average)
Wind direction	359° (1-min average)
Sky condition	1/8 cumulus at 1,280 m (4,200 ft); 3/8 stratocumulus at 1,981 m (6,500 ft)
Visibility	14.5 km (7.8 nmi)

### 5.46.3 STS–45 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 277–282 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–45 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 96. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 96. STS–45 pad exposure period hourly extremes.

Minimum temperature	6.1 °C (43 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	31%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.5 hPa (29.75 inHg)
Maximum sea level pressure	1,026.4 hPa (30.31 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 290°
Total precipitation	67.8 mm (2.67 in)

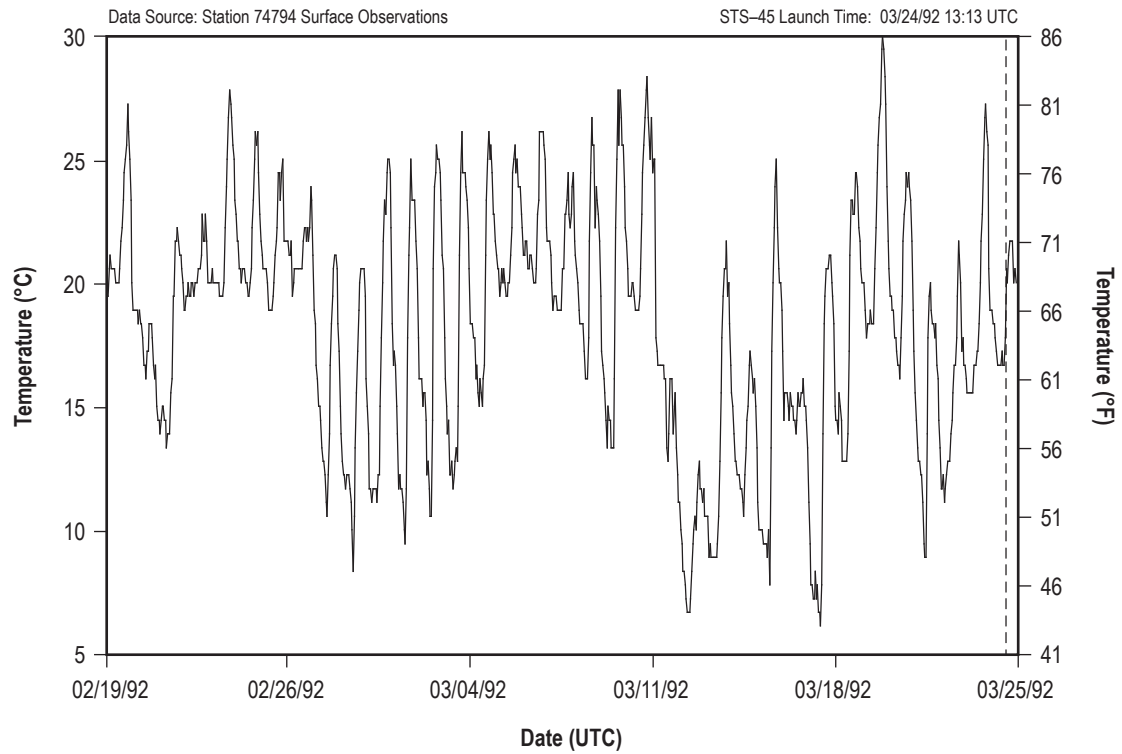


Figure 277. STS-45 hourly surface temperature.

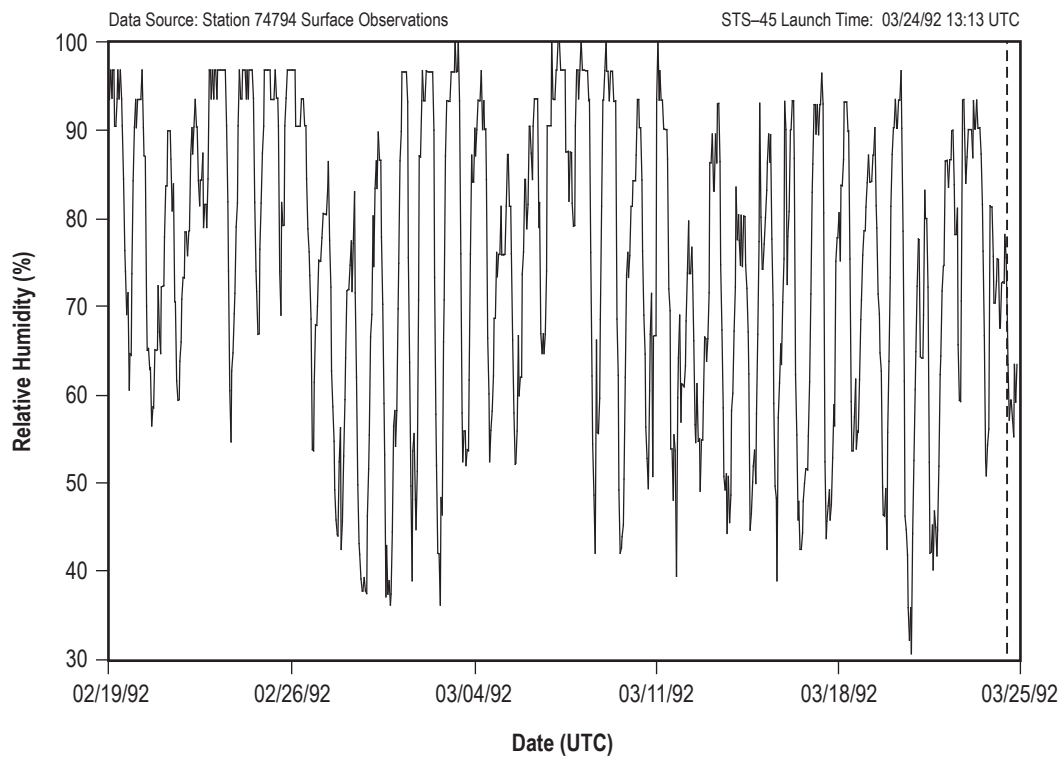


Figure 278. STS-45 hourly surface relative humidity.

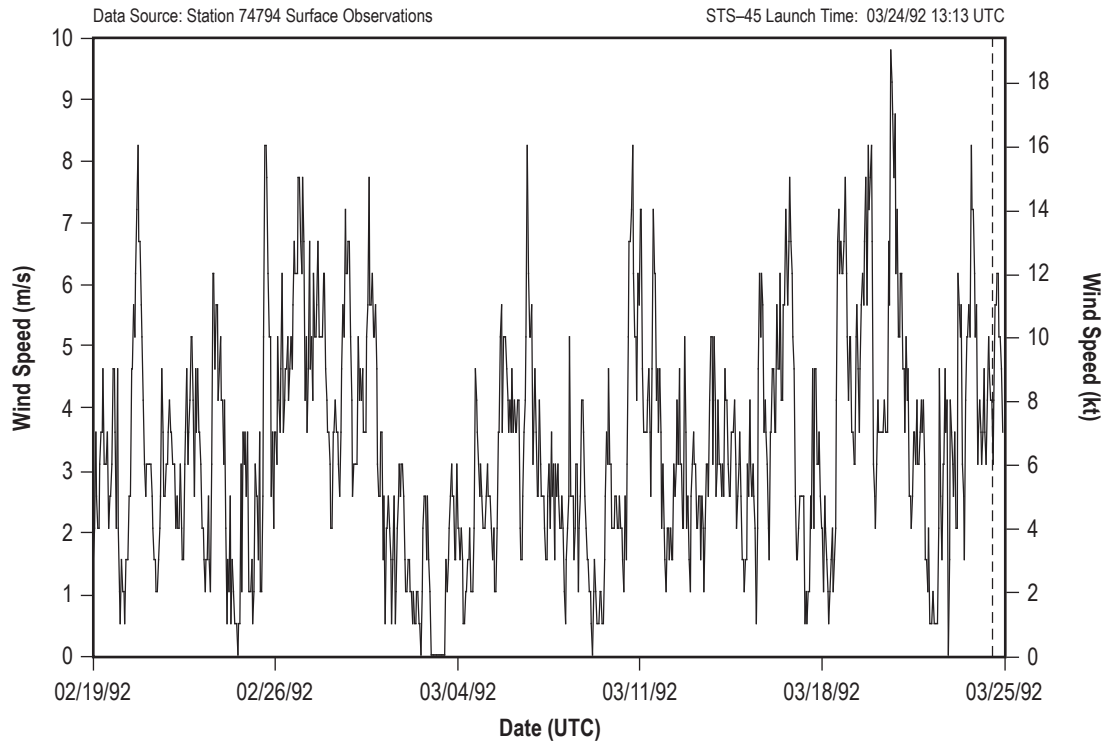


Figure 279. STS-45 hourly surface wind speed.

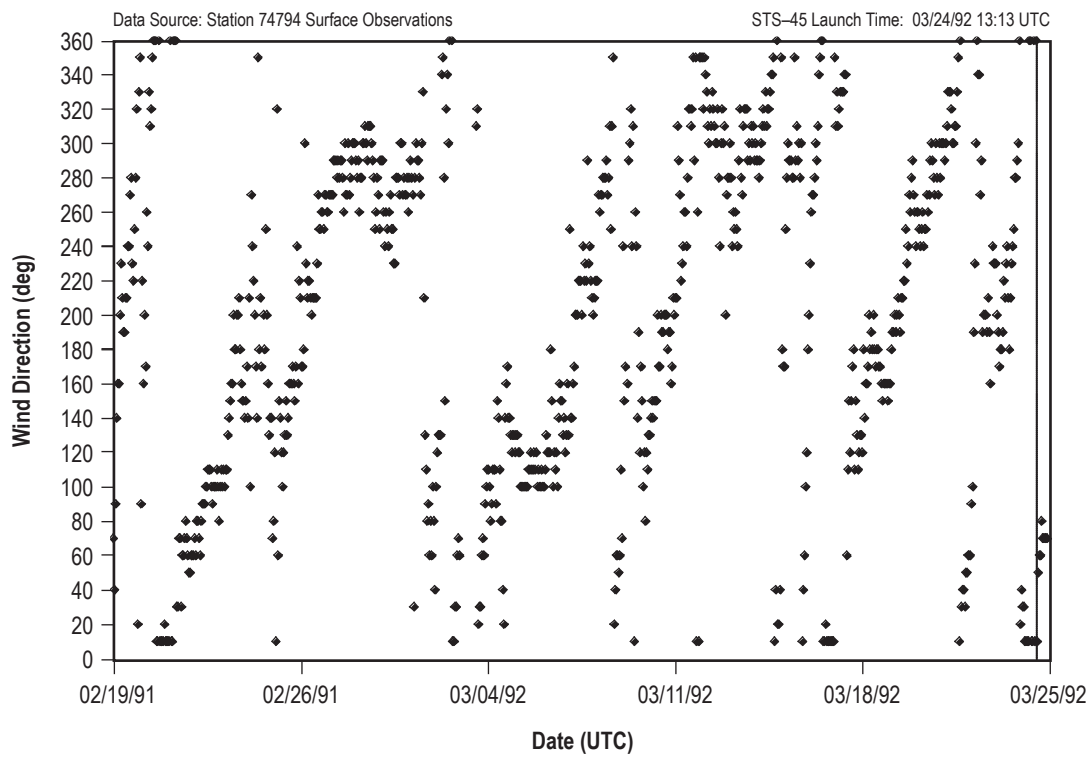


Figure 280. STS-45 hourly surface wind direction.



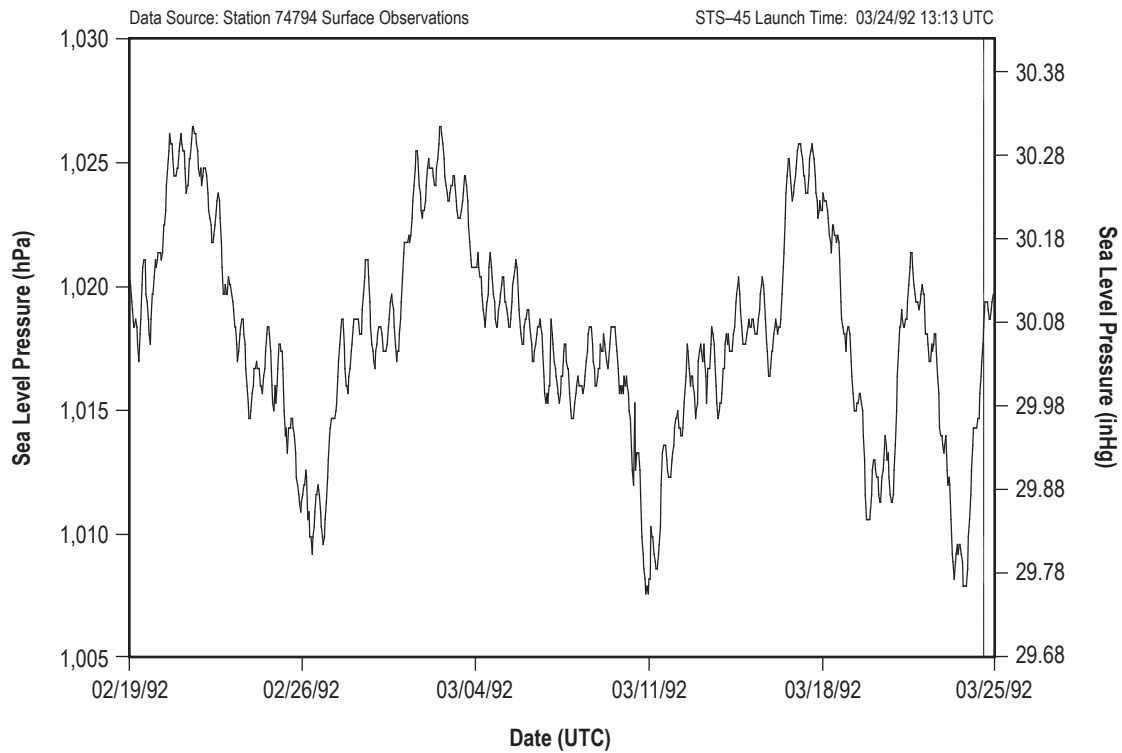


Figure 281. STS-45 hourly sea level pressure.

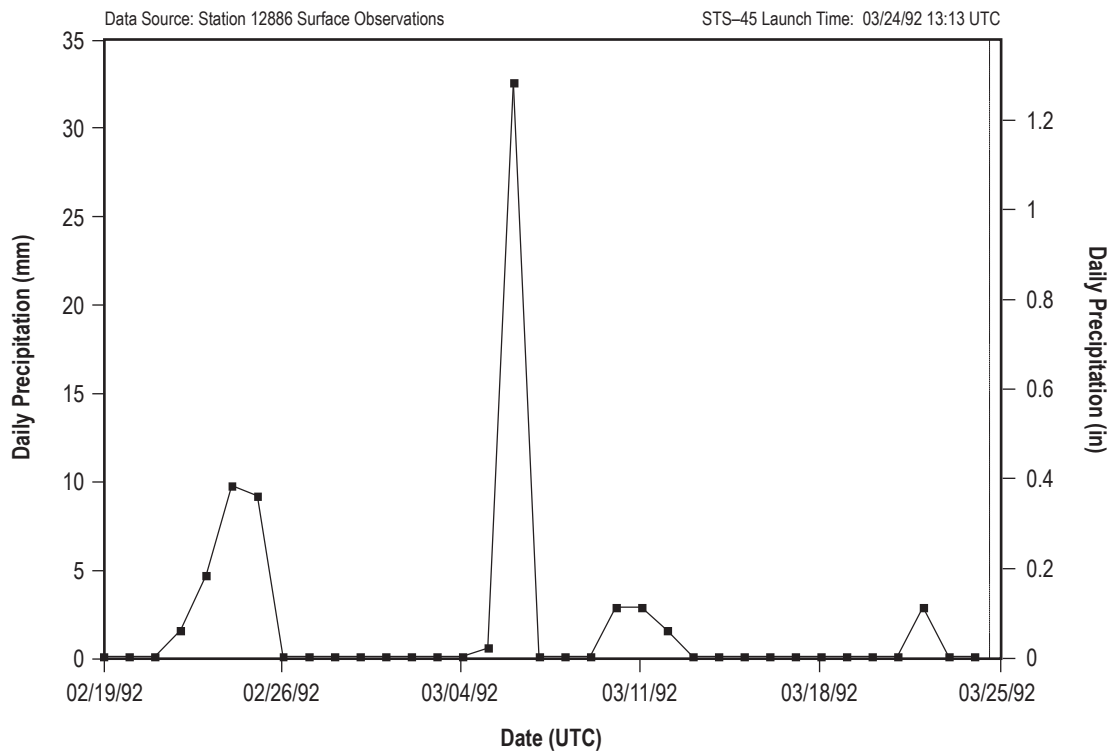


Figure 282. STS-45 daily precipitation totals.

## 5.47 STS–49

STS–49 was the first mission for *Endeavour* (OV–105). It rolled out to pad 39B on March 13, 1992. STS–49 was exposed on the pad for 56 days and launched on May 7, 1992, at 23:40 UTC.

### 5.47.1 STS–49 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–49.

### 5.47.2 STS–49 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–49 are shown in table 97. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 97.

Table 97. STS–49 L–0 surface observations.

Temperature	17.2 °C (63 °F)
Relative humidity	70%
Sea level pressure	1,013.5 hPa (29.93 inHg)
Wind speed	4.1 m/s (8 kt) (1-min average)
Wind direction	322° (1-min average)
Sky condition	3/8 cumulus at 701 m (2,300 ft); 1/8 stratocumulus at 1,097 m (3,600 ft); 1/8 altocumulus at 2,134 m (7,000 ft)
Visibility	11.3 km (6.1 nmi)

### 5.47.3 STS–49 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 283–288 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–49 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 98. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 98. STS–49 pad exposure period hourly extremes.

Minimum temperature	6.1 °C (43 °F)
Maximum temperature	30.6 °C (87 °F)
Minimum relative humidity	22%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.8 hPa (29.76 inHg)
Maximum sea level pressure	1,027.5 hPa (30.34 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 290°
Total precipitation	148.6 mm (5.85 in)

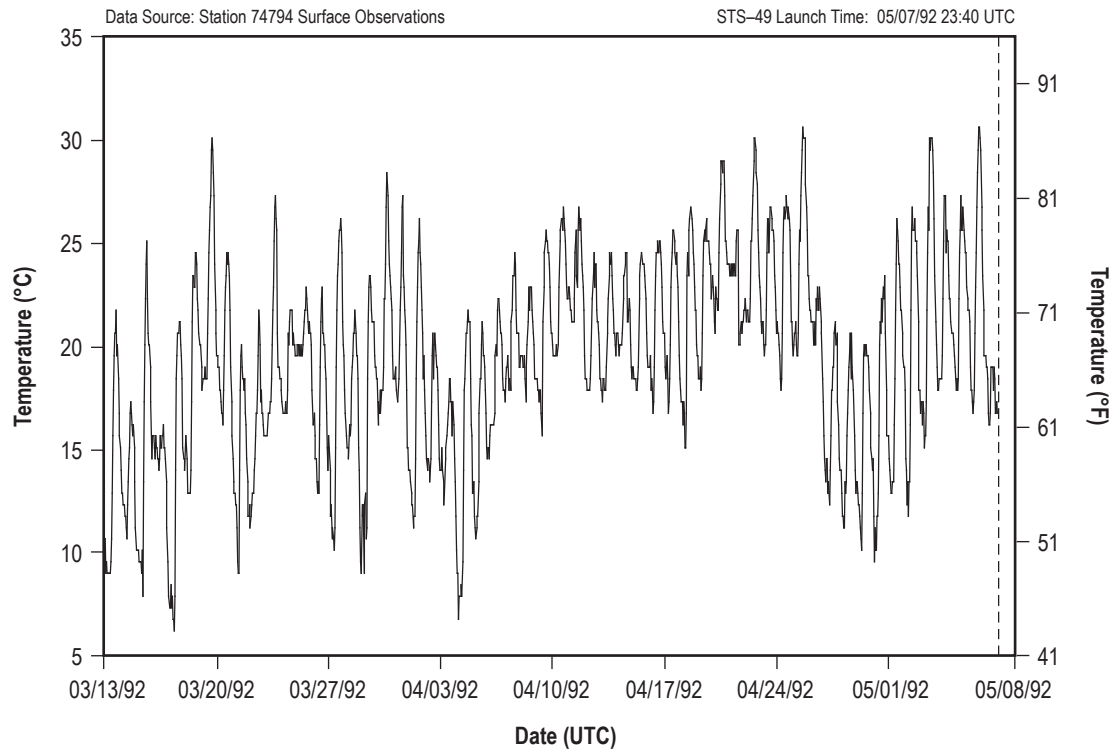


Figure 283. STS-49 hourly surface temperature.

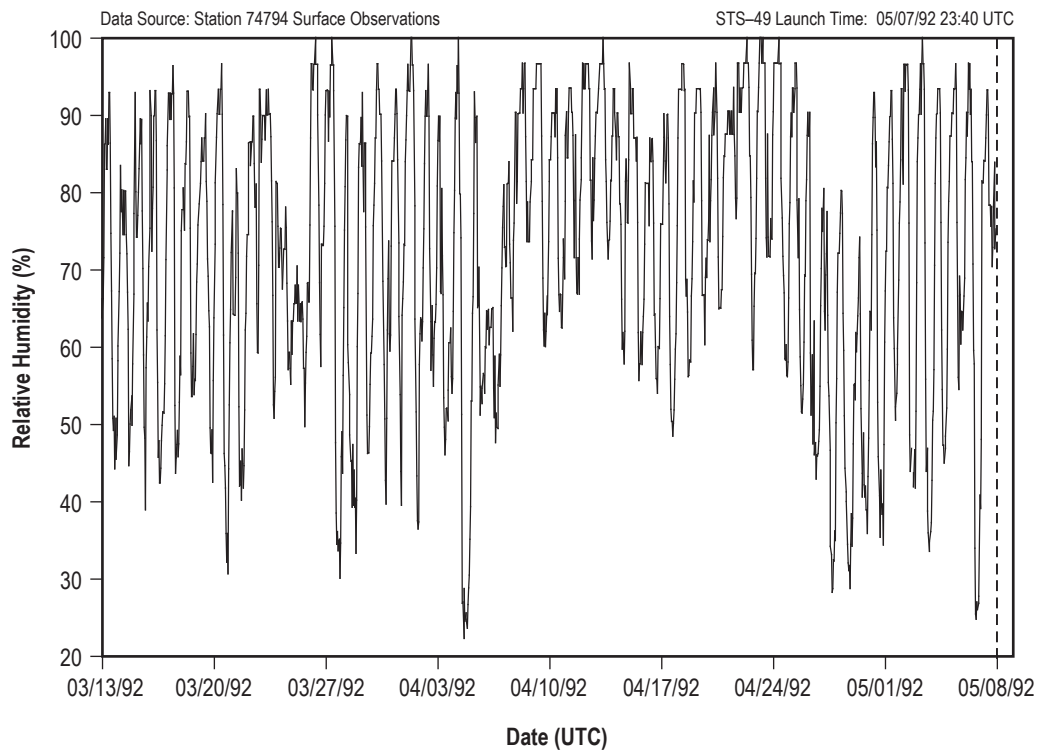


Figure 284. STS-49 hourly surface relative humidity.

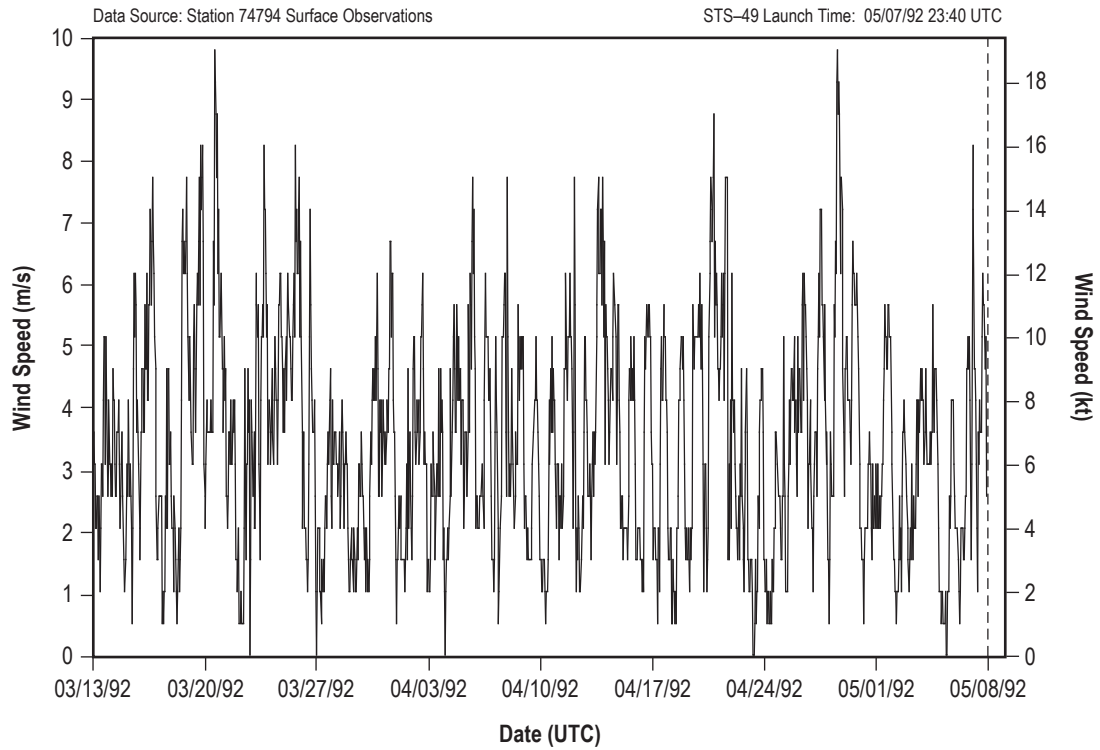


Figure 285. STS-49 hourly surface wind speed.

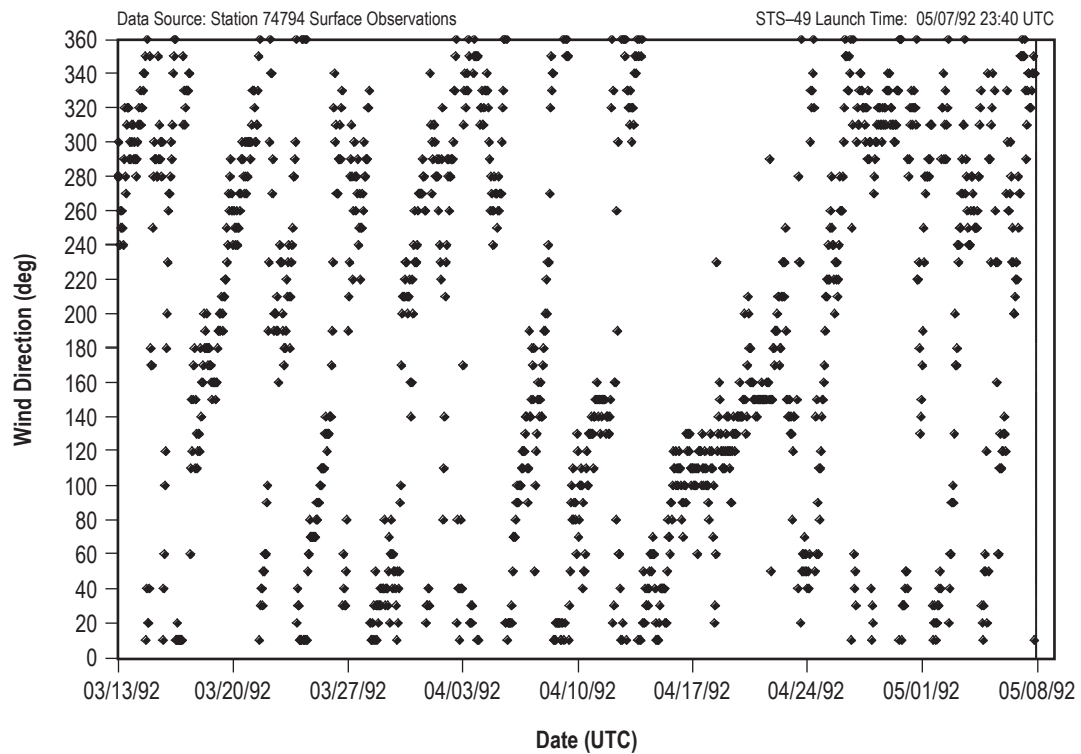


Figure 286. STS-49 hourly surface wind direction.

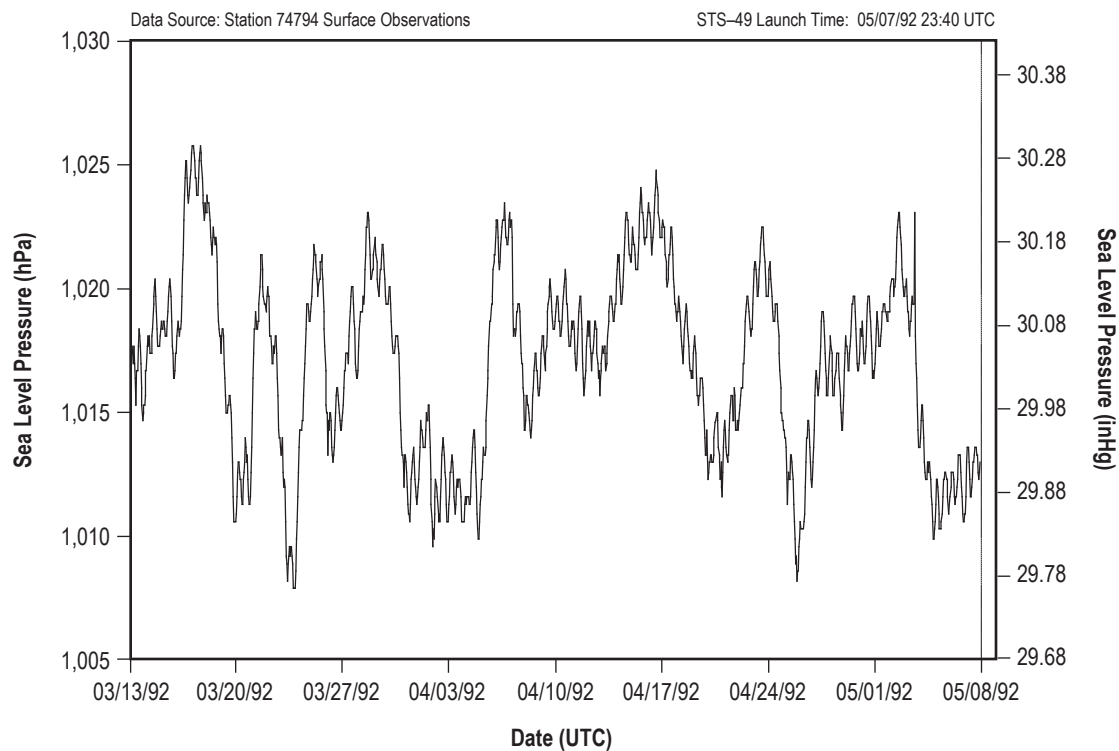


Figure 287. STS-49 hourly sea level pressure.

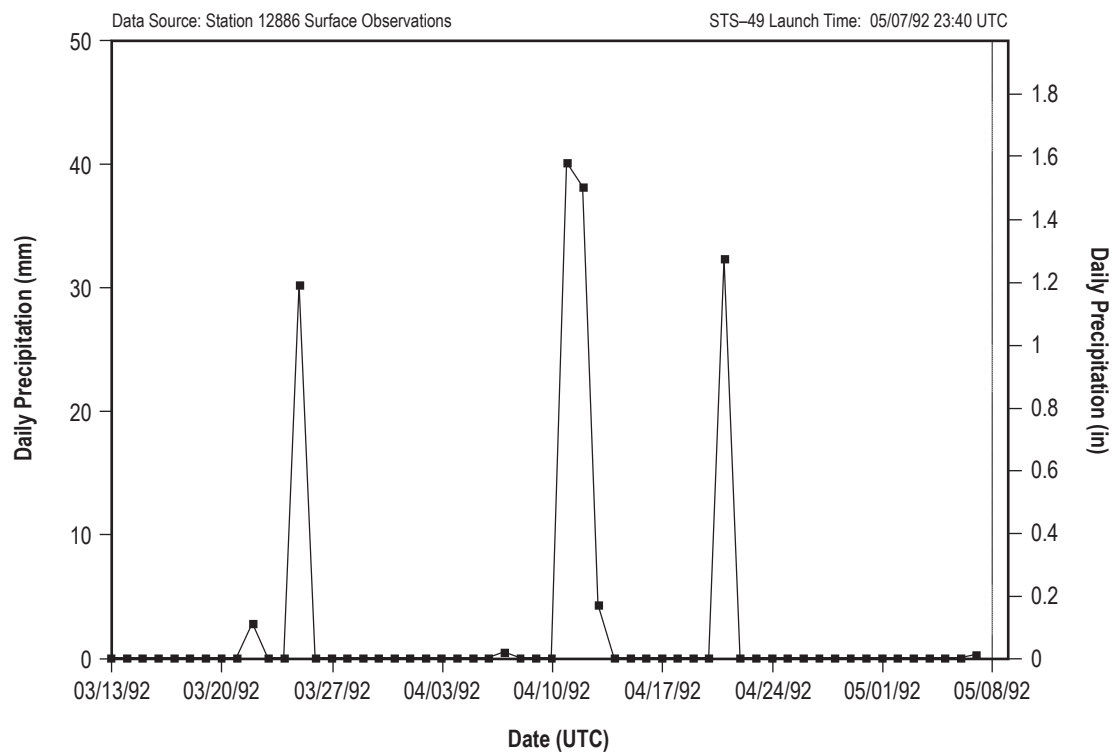


Figure 288. STS-49 daily precipitation totals.

## 5.48 STS-50

STS-50 was the 12th mission for *Columbia* (OV-102). It rolled out to pad 39A on June 3, 1992. STS-50 was exposed on the pad for 23 days and launched on June 25, 1992, at 16:12 UTC.

### 5.48.1 STS-50 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS-50.

### 5.48.2 STS-50 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-50 are shown in table 99. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 99.

Table 99. STS-50 L-0 surface observations.

Temperature	28.3 °C (83 °F)
Relative humidity	72%
Sea level pressure	1,013.2 hPa (29.92 inHg)
Wind speed	6.9 m/s (13.4 kt) (1-min average)
Wind direction	151° (1-min average)
Sky condition	2/8 cumulus at 792 m (2,600 ft); 4/8 altocumulus at 3,962 m (13,000 ft); 7/8 cirrostratus at 8,534 m (28,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.48.3 STS-50 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 289–294 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-50 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 100. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 100. STS-50 pad exposure period hourly extremes.

Minimum temperature	20 °C (68 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	46%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.8 hPa (29.76 inHg)
Maximum sea level pressure	1,020 hPa (30.12 inHg)
Maximum wind speed and associated wind direction	10.8 m/s (21 kt) 170°
Total precipitation	198.9 mm (7.83 in)

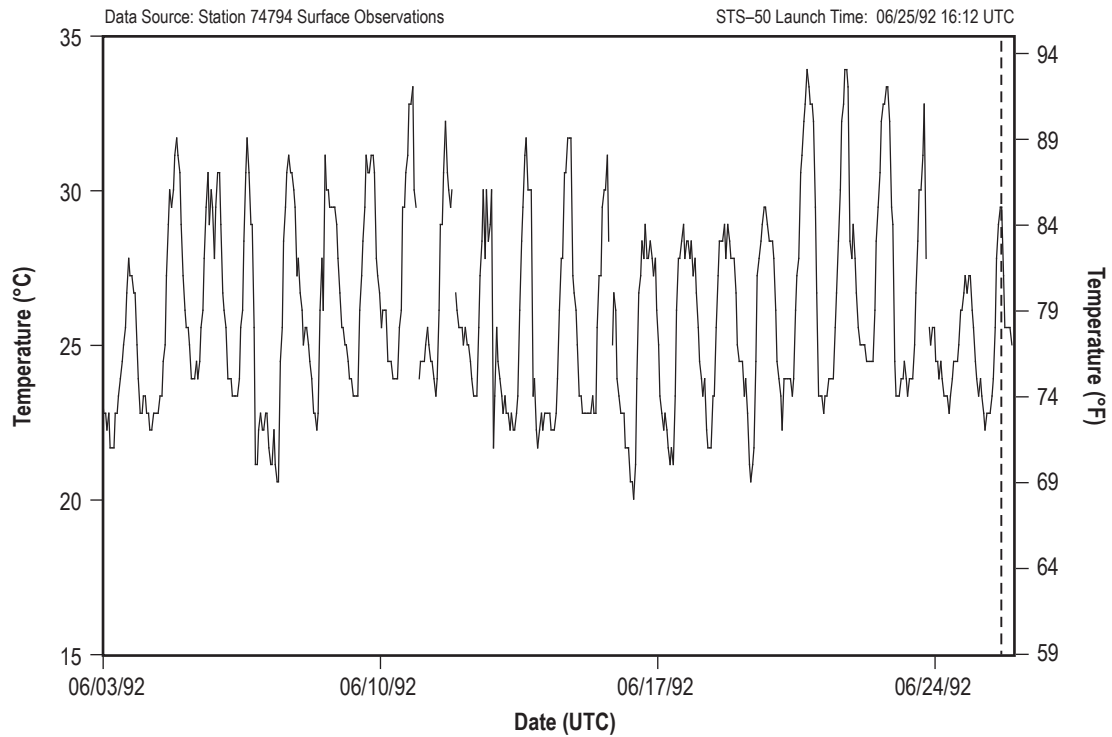


Figure 289. STS-50 hourly surface temperature.

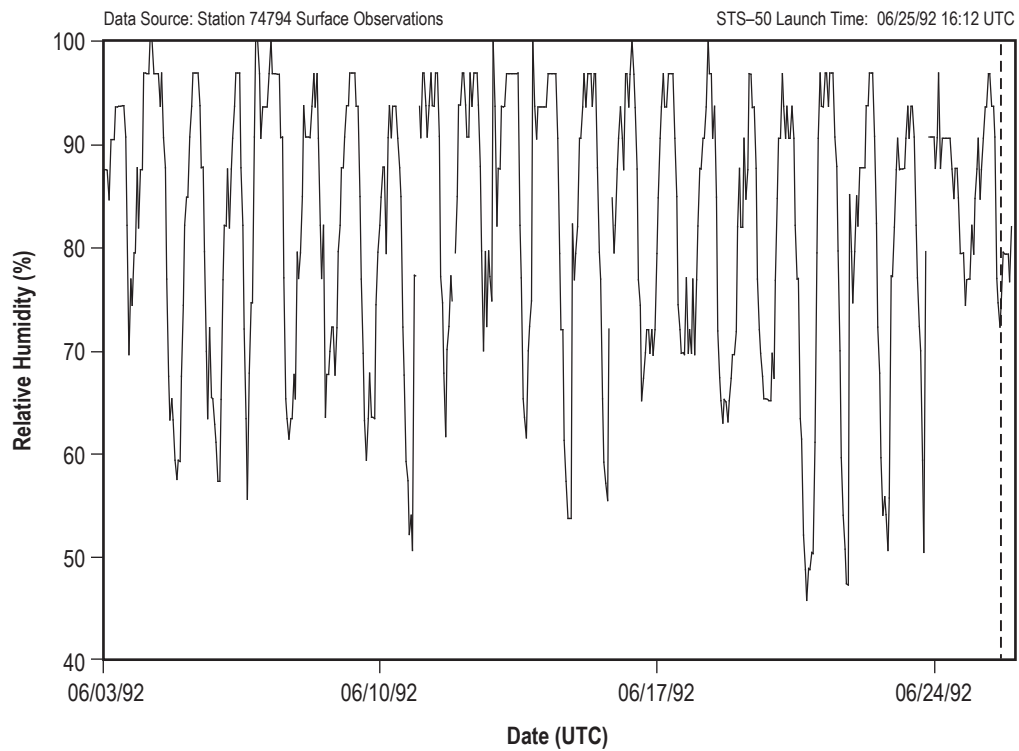


Figure 290. STS-50 hourly surface relative humidity.

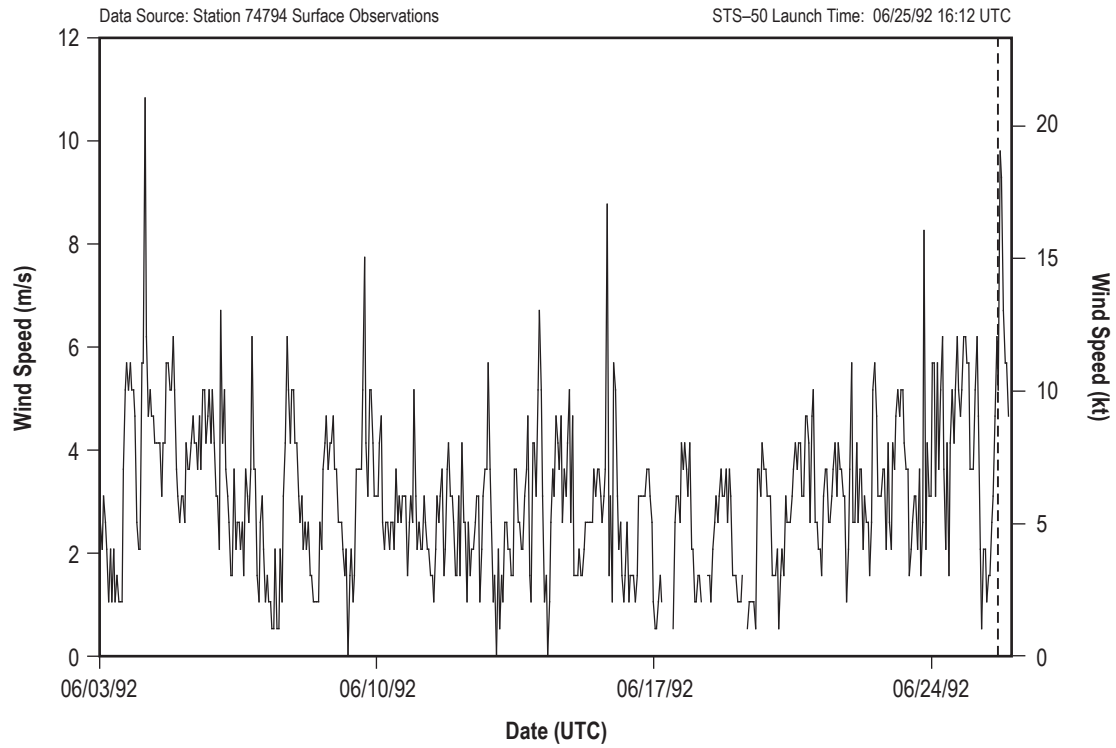


Figure 291. STS-50 hourly surface wind speed.

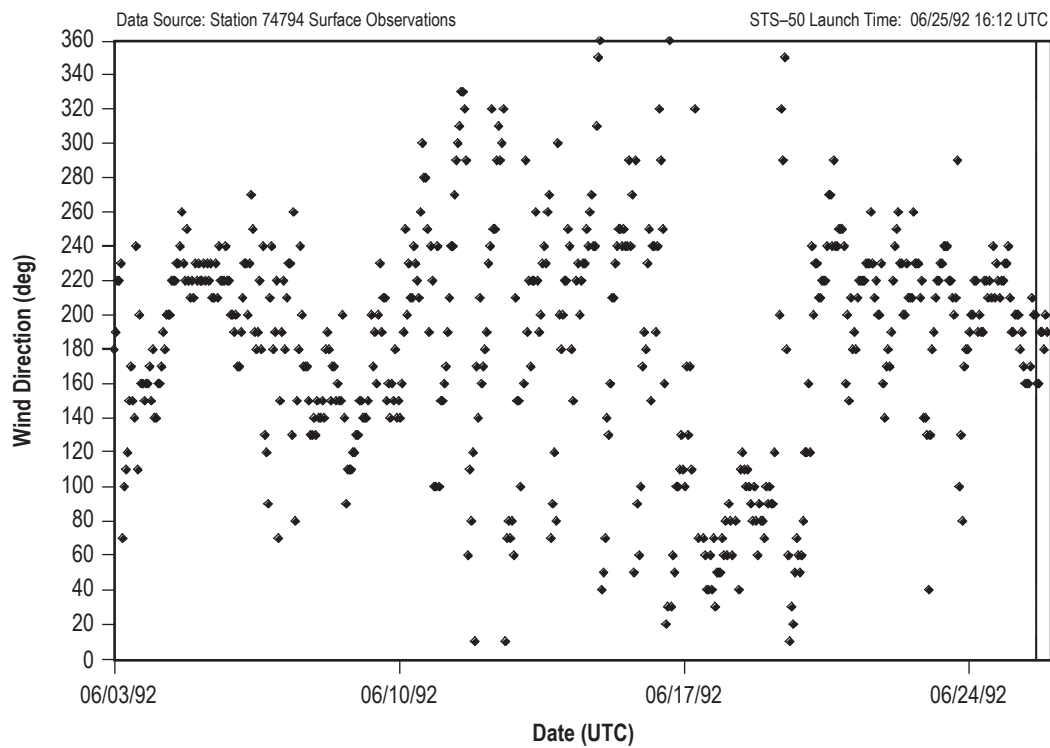


Figure 292. STS-50 hourly surface wind direction.



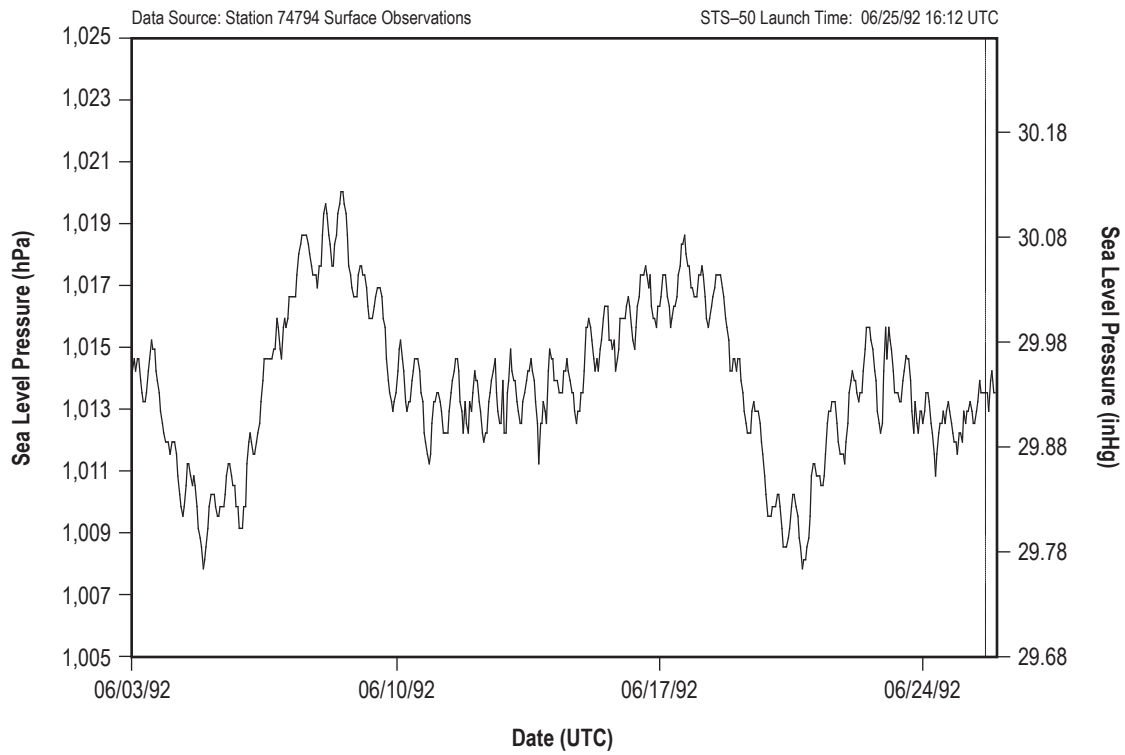


Figure 293. STS-50 hourly sea level pressure.

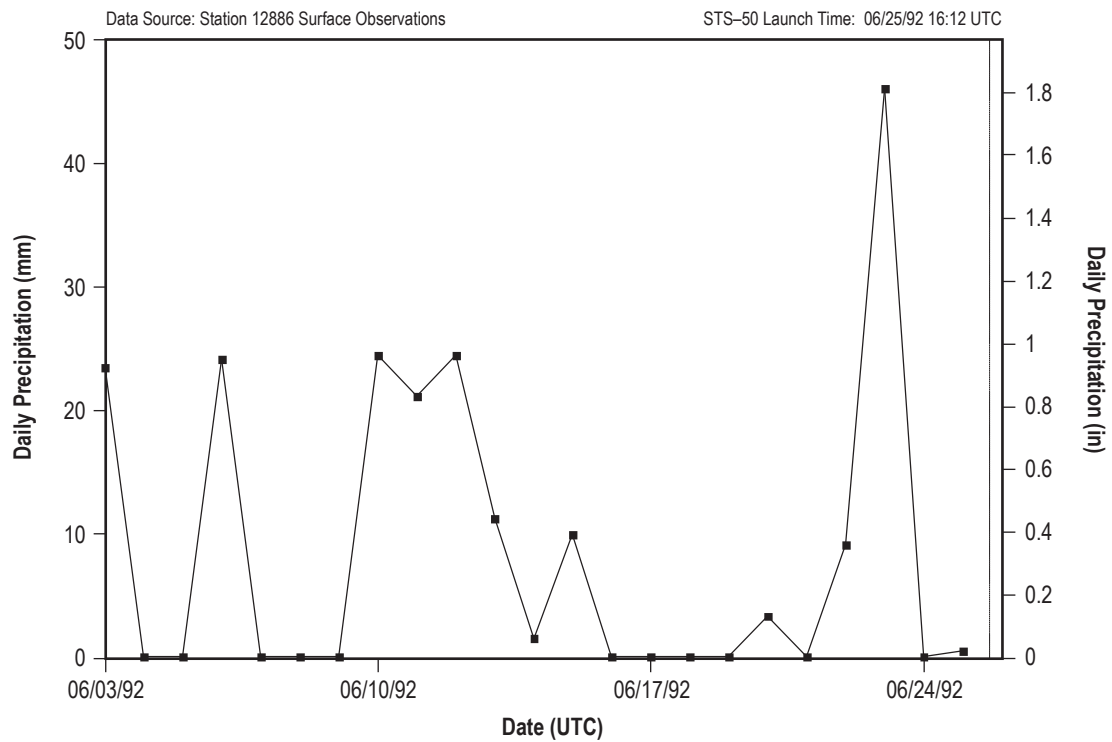


Figure 294. STS-50 daily precipitation totals.

## 5.49 STS–46

STS–46 was the 12th mission for *Atlantis* (OV–104). It rolled out to pad 39B on June 11, 1992. STS–46 was exposed on the pad for 51 days and launched on July 31, 1992, at 13:57 UTC.

### 5.49.1 STS–46 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–46.

### 5.49.2 STS–46 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–46 are shown in table 101. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 101.

Table 101. STS–46 L–0 surface observations.

Temperature	28.9 °C (84 °F)
Relative humidity	76%
Sea level pressure	1,020.3 hPa (30.13 inHg)
Wind speed	3.2 m/s (6.3 kt) (1-min average)
Wind direction	310° (1-min average)
Sky condition	2/8 cumulus at 488 m (1,600 ft)
Visibility	11.3 km (6.1 nmi)

### 5.49.3 STS–46 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 295–300 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–46 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 102. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 102. STS–46 pad exposure period hourly extremes.

Minimum temperature	20 °C (68 °F)
Maximum temperature	35.6 °C (96 °F)
Minimum relative humidity	38%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.8 hPa (29.76 inHg)
Maximum sea level pressure	1,024.4 hPa (30.25 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 160°
Total precipitation	251.2 mm (9.89 in)

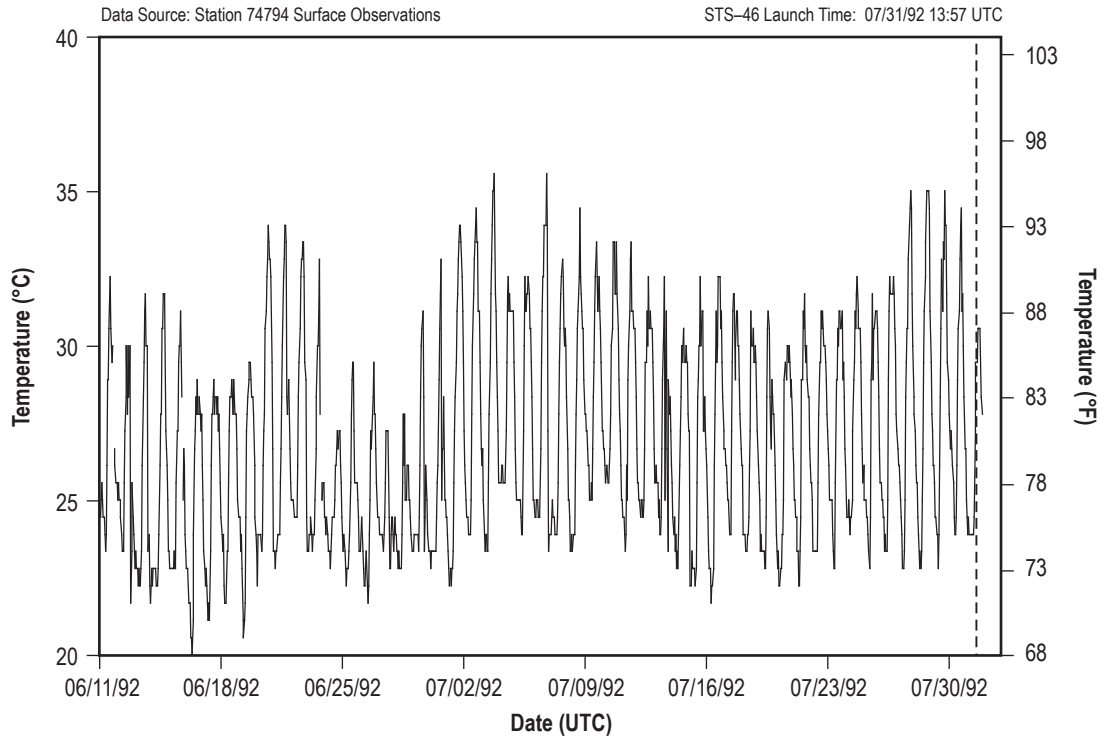


Figure 295. STS-46 hourly surface temperature.

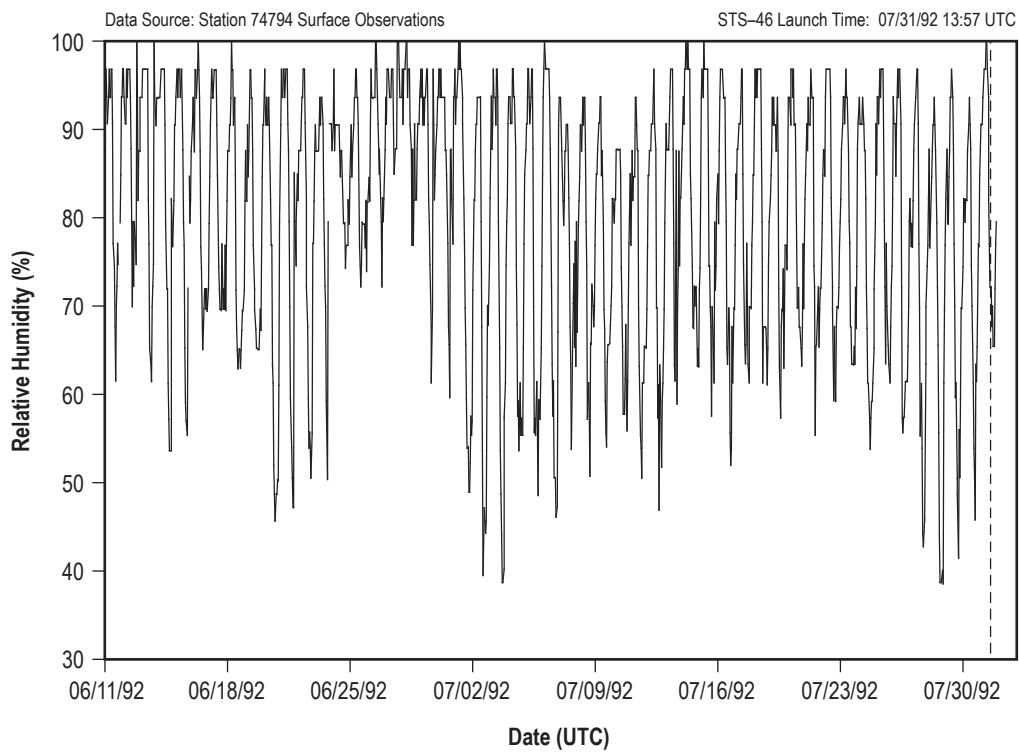


Figure 296. STS-46 hourly surface relative humidity.

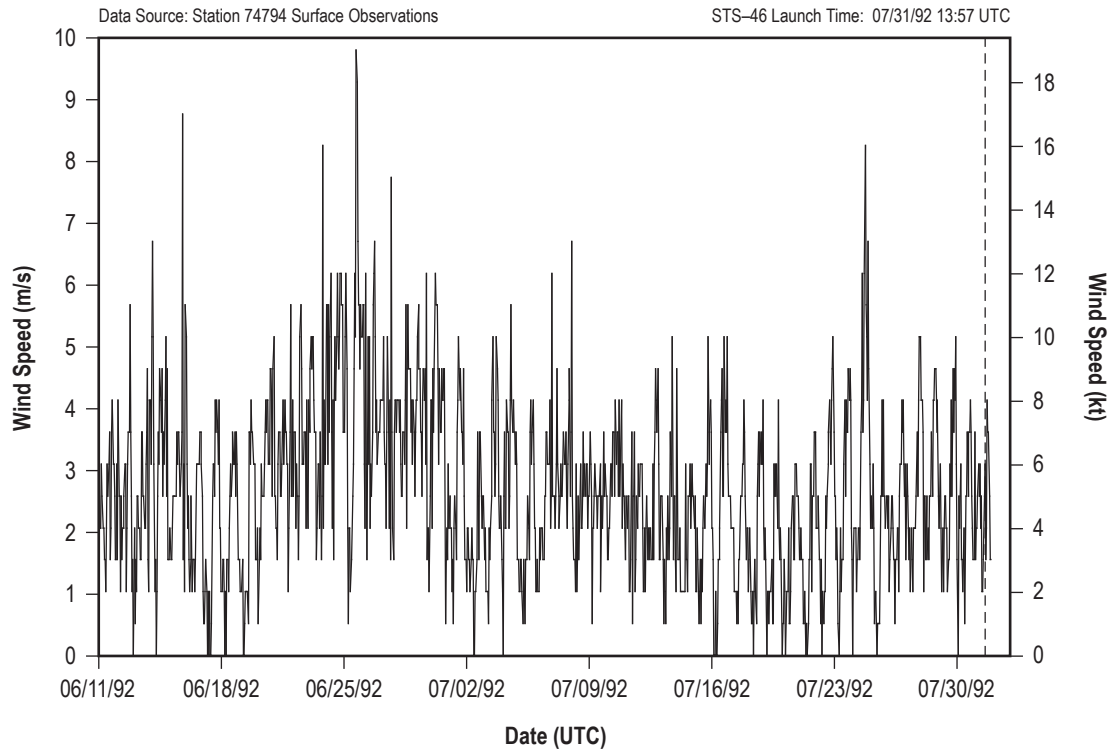


Figure 297. STS-46 hourly surface wind speed.

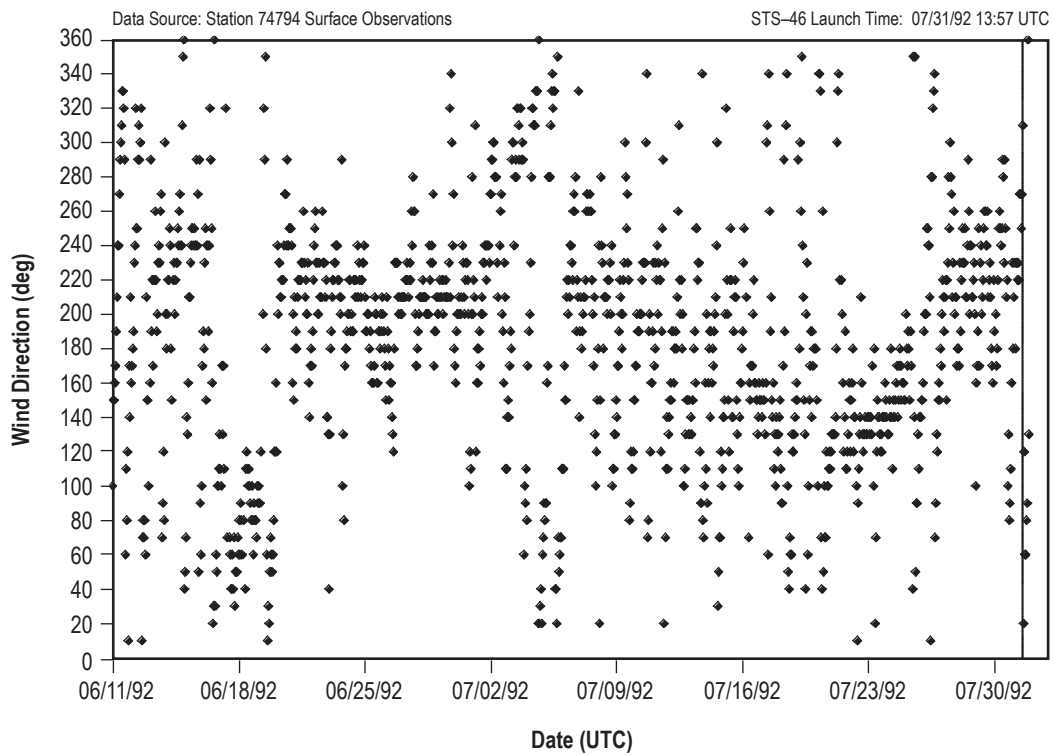


Figure 298. STS-46 hourly surface wind direction.

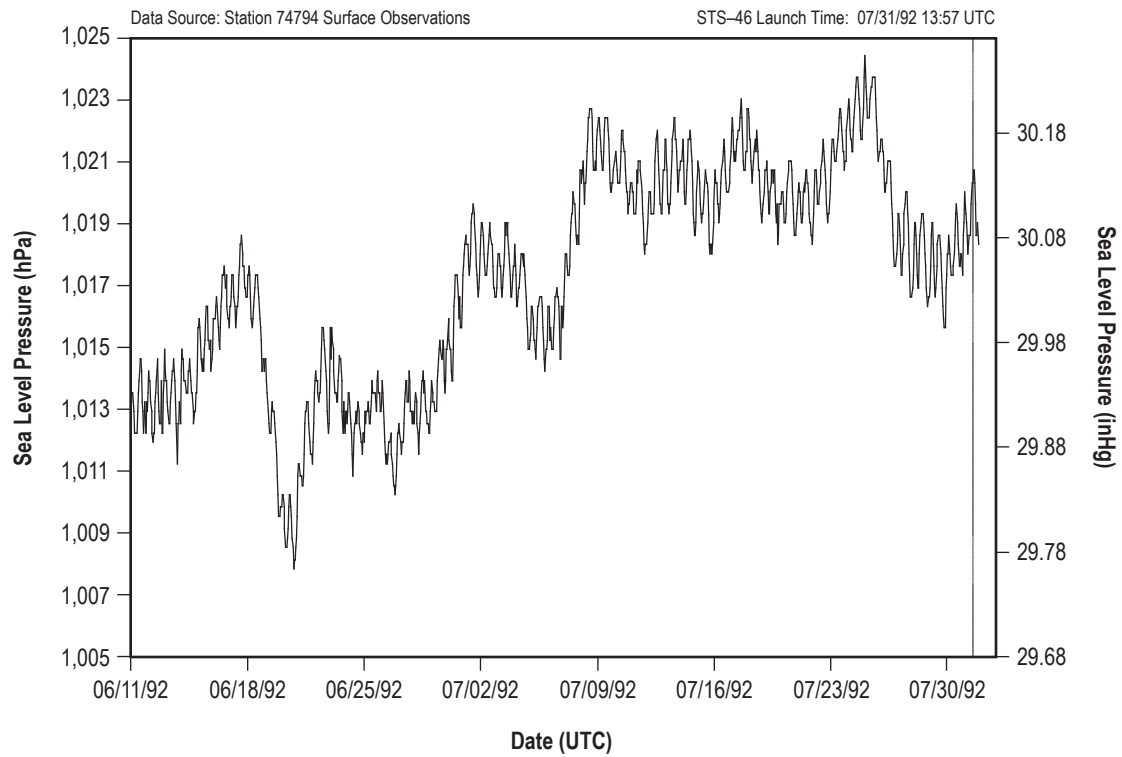


Figure 299. STS-46 hourly sea level pressure.

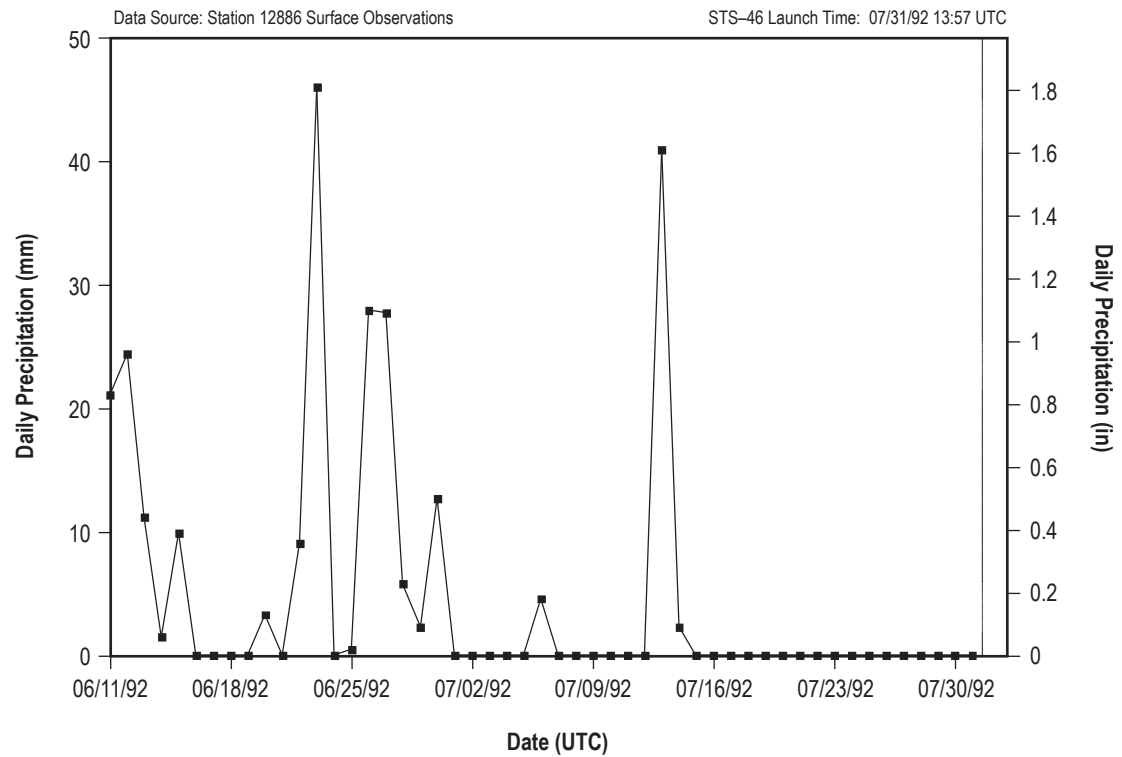


Figure 300. STS-46 daily precipitation totals.

## 5.50 STS–47

STS–47 was the second mission for *Endeavour* (OV–105). It rolled out to pad 39B on August 25, 1992. STS–47 was exposed on the pad for 19 days and launched on September 12, 1992, at 14:23 UTC.

### 5.50.1 STS–47 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS–47.

### 5.50.2 STS–47 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–47 are shown in table 103. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 103. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 103. STS–47 L–0 surface observations.

Temperature	27.8 °C (82 °F)
Relative humidity	70%
Sea level pressure	1,020.1 hPa (30.12 inHg)
Wind speed	5 m/s (9.7 kt) (1-min average)
Wind direction	44° (1-min average)
Sky condition	1/8 cumulus at 701 m (2,300 ft)
Visibility	11.3 km (6.1 nmi)

### 5.50.3 STS–47 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 301–306 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–47 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 104. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 104. STS–47 pad exposure period hourly extremes.

Minimum temperature	21.1 °C (70 °F)
Maximum temperature	33.3 °C (92 °F)
Minimum relative humidity	44%
Maximum relative humidity	97%
Minimum sea level pressure	1,014.6 hPa (29.96 inHg)
Maximum sea level pressure	1,022.4 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	8.8 m/s (17 kt) 290°
Total precipitation	27.9 mm (1.1 in)

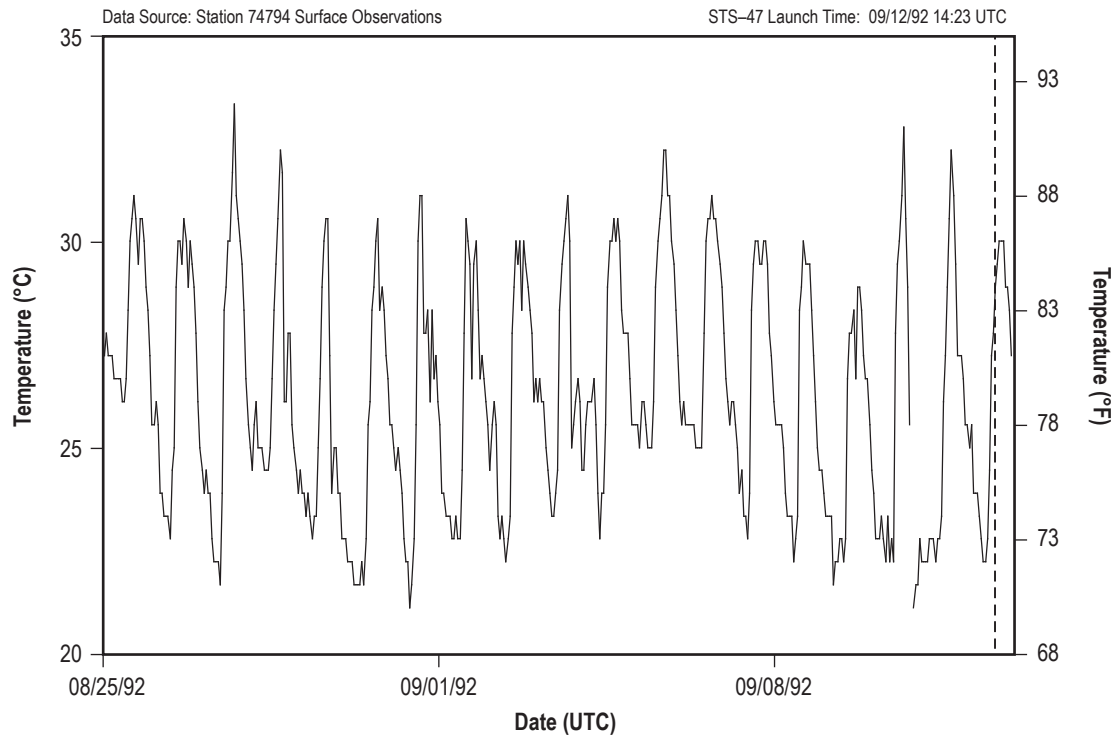


Figure 301. STS-47 hourly surface temperature.

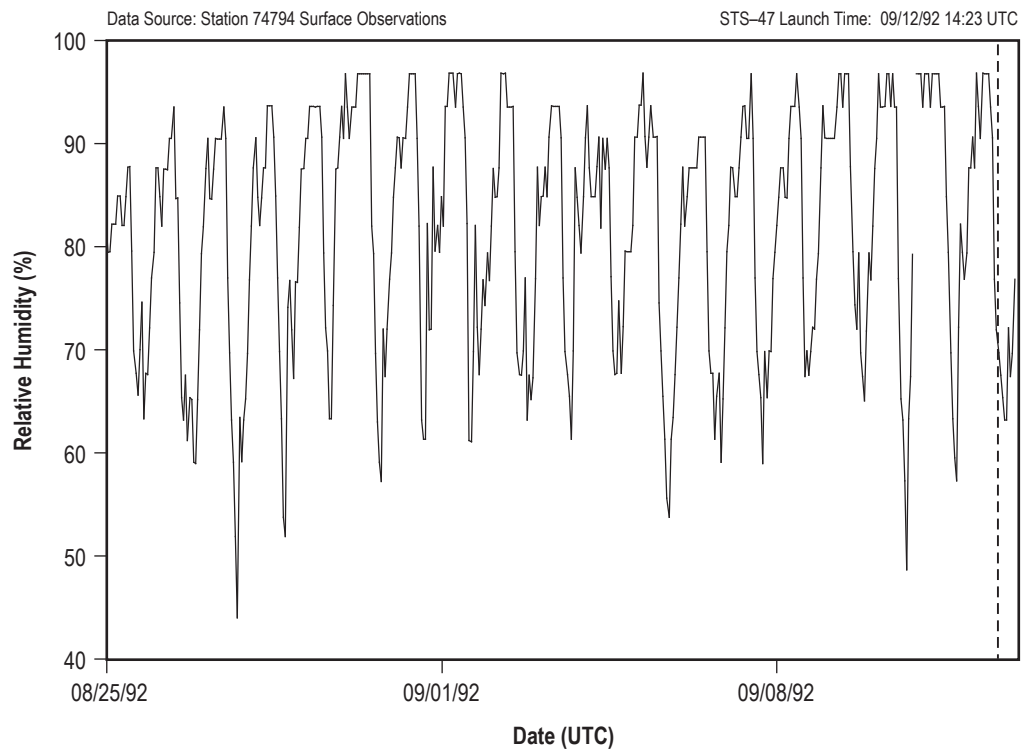


Figure 302. STS-47 hourly surface relative humidity.

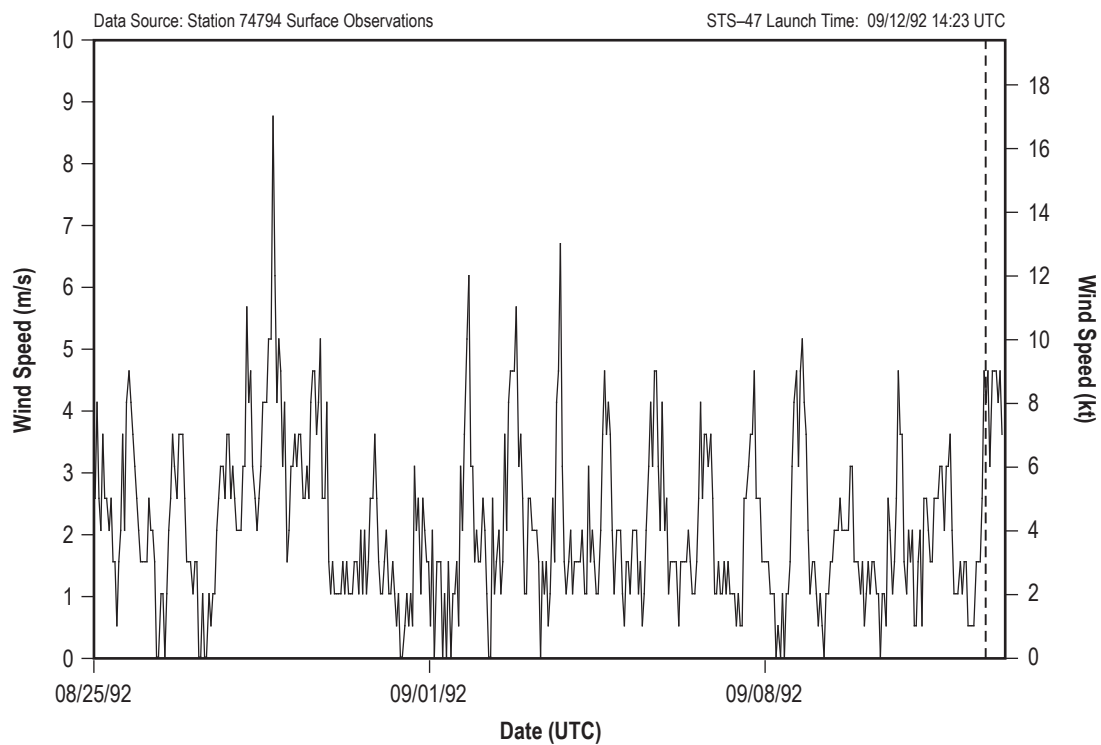


Figure 303. STS-47 hourly surface wind speed.

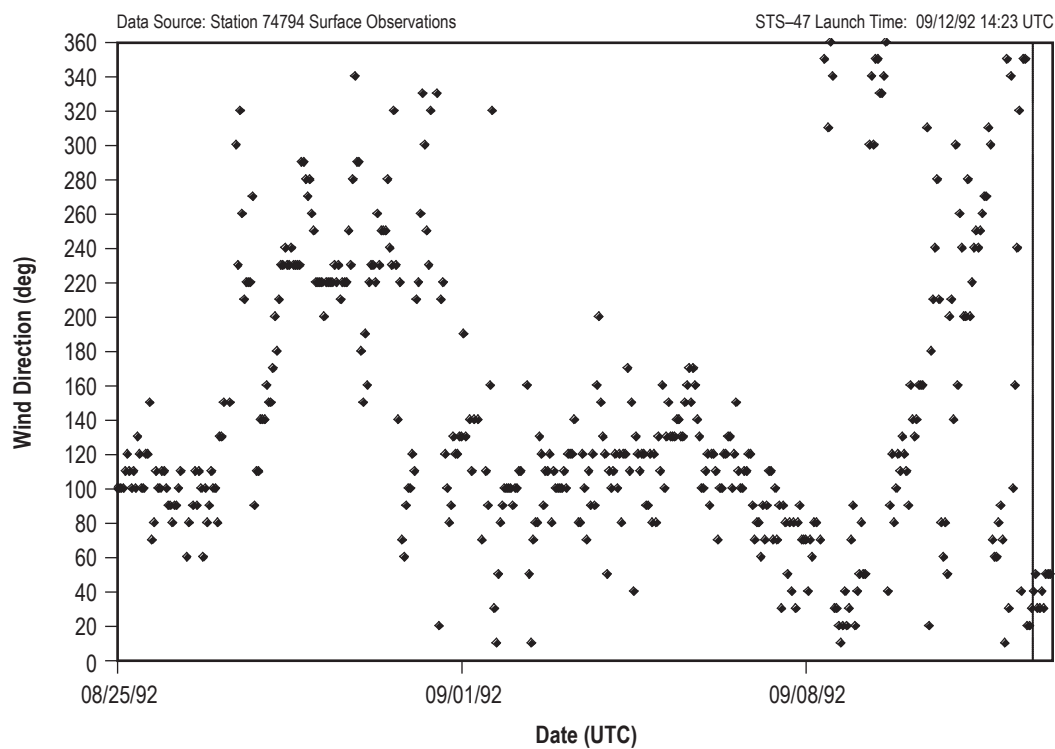


Figure 304. STS-47 hourly surface wind direction.



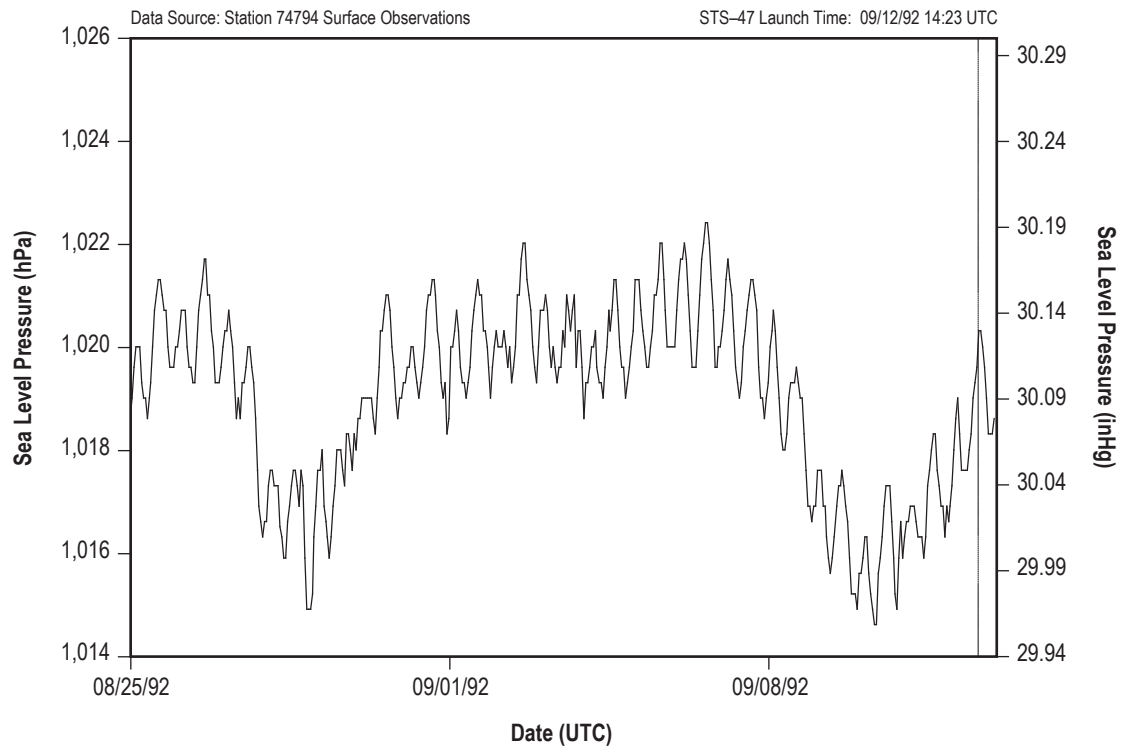


Figure 305. STS-47 hourly sea level pressure.

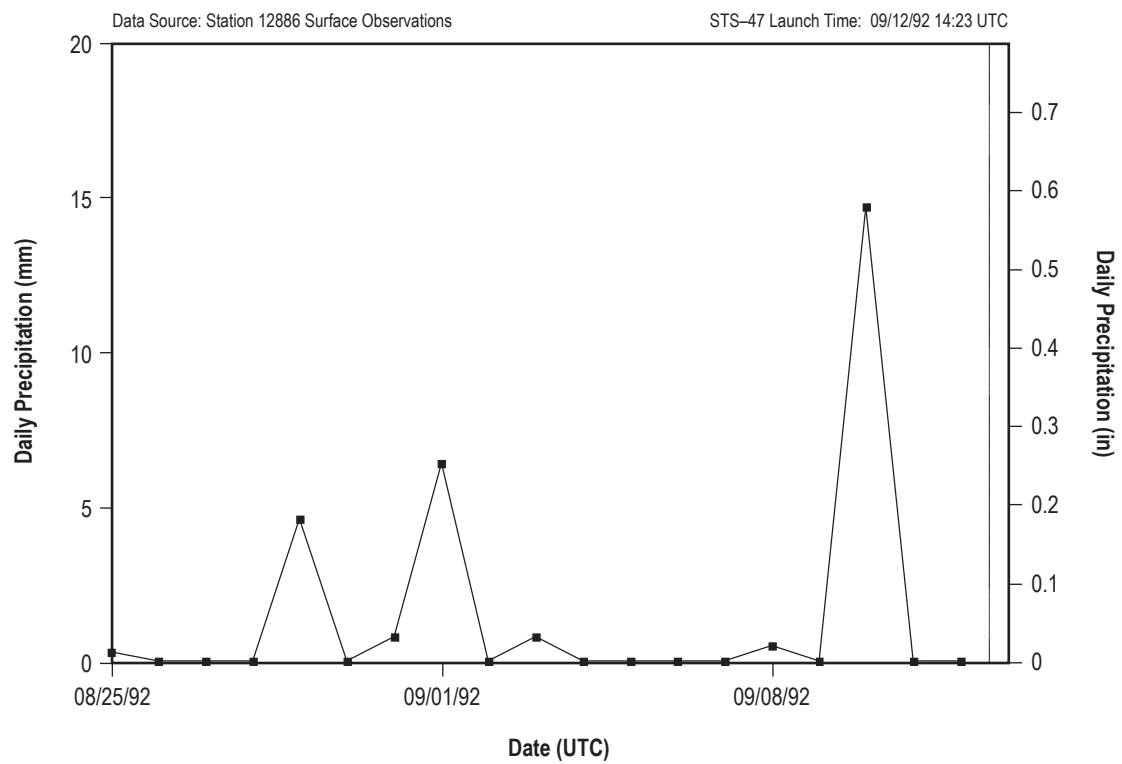


Figure 306. STS-47 daily precipitation totals.

## 5.51 STS-52

STS-52 was the 13th mission for *Columbia* (OV-102). It rolled out to pad 39B on September 26, 1992. STS-52 was exposed on the pad for 27 days and launched on October 22, 1992, at 17:10 UTC.

### 5.51.1 STS-52 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS-52.

### 5.51.2 STS-52 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-52 are shown in table 105. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 105. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 105. STS-52 L-0 surface observations.

Temperature	25 °C (77 °F)
Relative humidity	49%
Sea level pressure	1,027.7 hPa (30.35 inHg)
Wind speed	8.4 m/s (16.4 kt) (1-min average)
Wind direction	48° (1-min average)
Sky condition	1/8 stratocumulus at 1,219 m (4,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.51.3 STS-52 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 307–312 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-52 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 106. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 106. STS-52 pad exposure period hourly extremes.

Minimum temperature	15 °C (59 °F)
Maximum temperature	31.1 °C (88 °F)
Minimum relative humidity	46%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.5 hPa (29.75 inHg)
Maximum sea level pressure	1,028.8 hPa (30.38 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 230°
Total precipitation	155.4 mm (6.12 in)

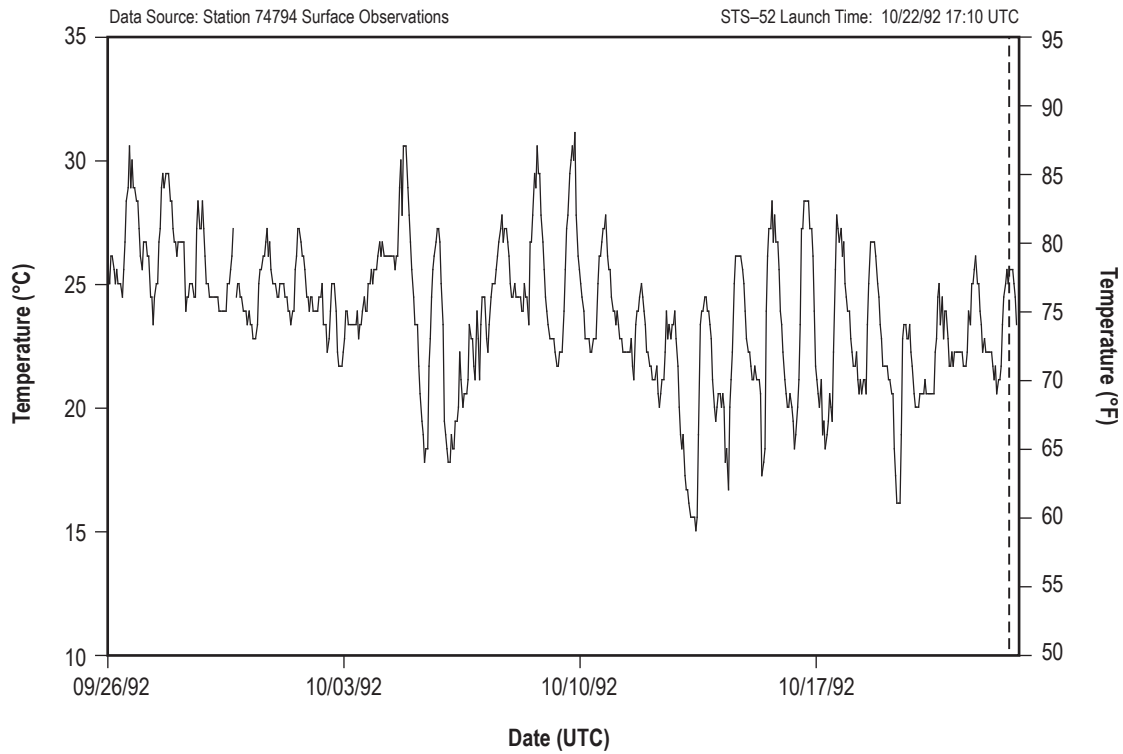


Figure 307. STS-52 hourly surface temperature.

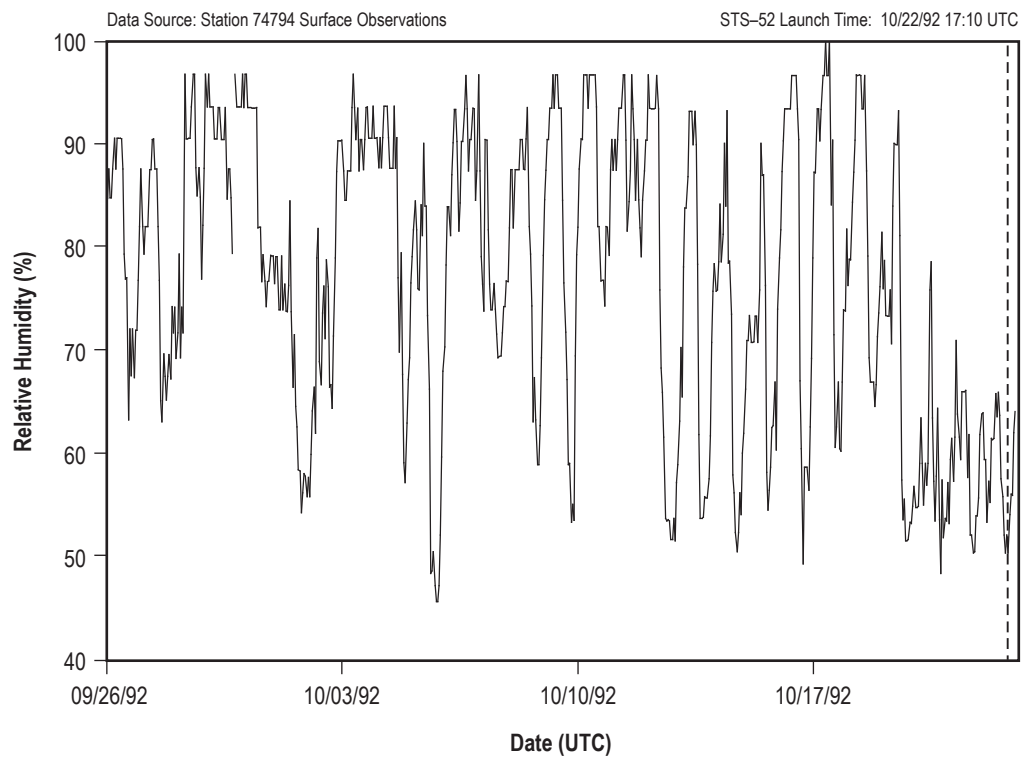


Figure 308. STS-52 hourly surface relative humidity.

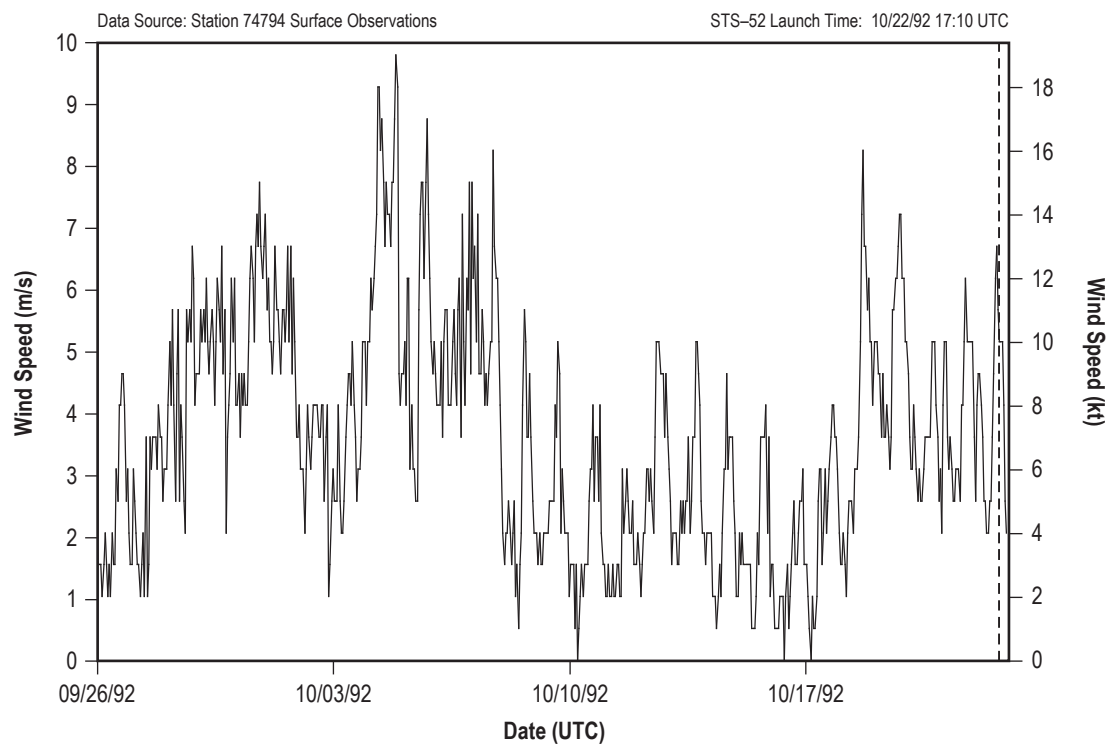


Figure 309. STS-52 hourly surface wind speed.

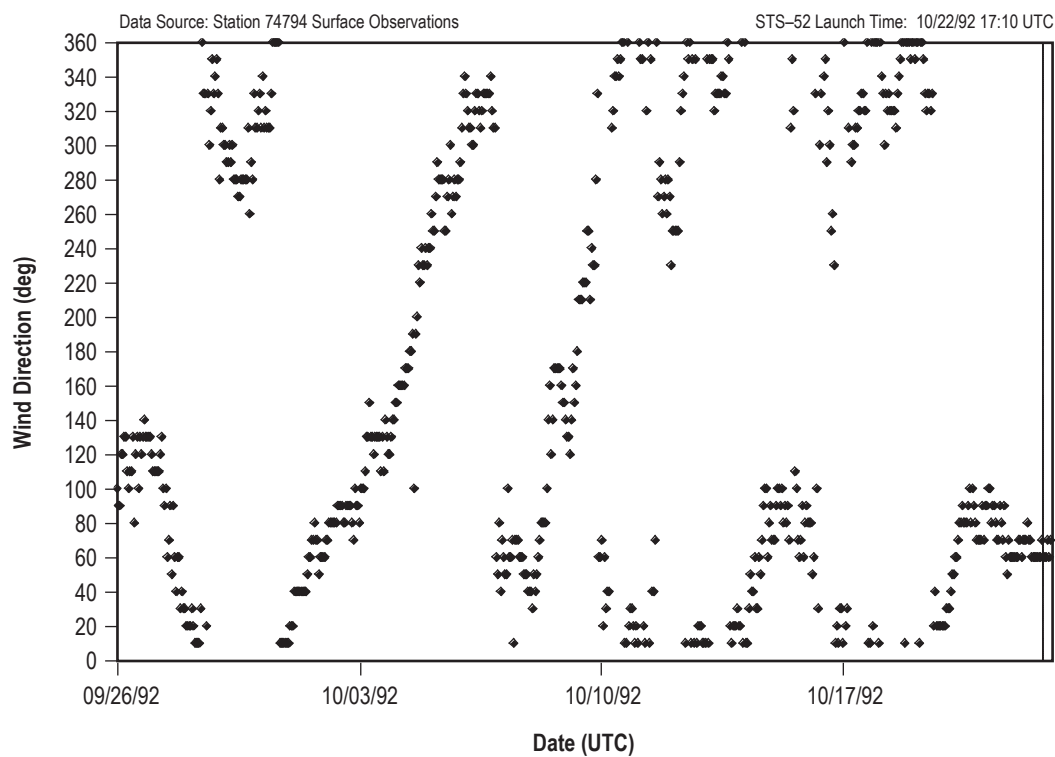


Figure 310. STS-52 hourly surface wind direction.

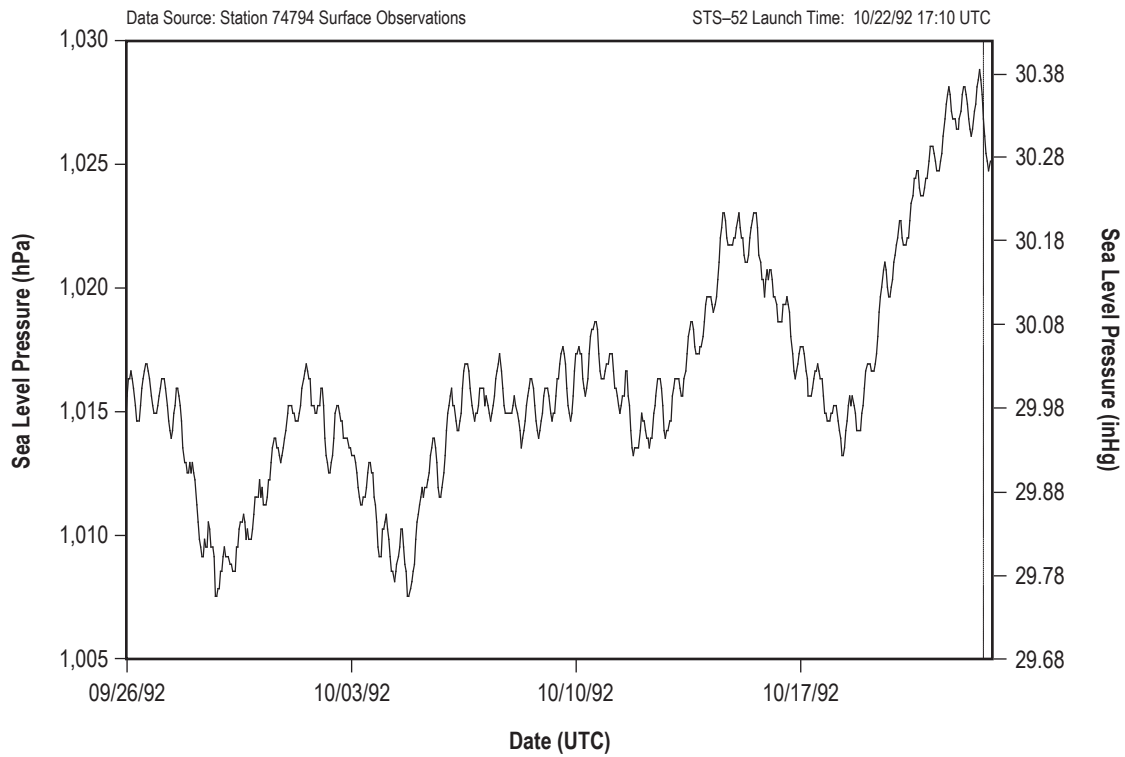


Figure 311. STS-52 hourly sea level pressure.

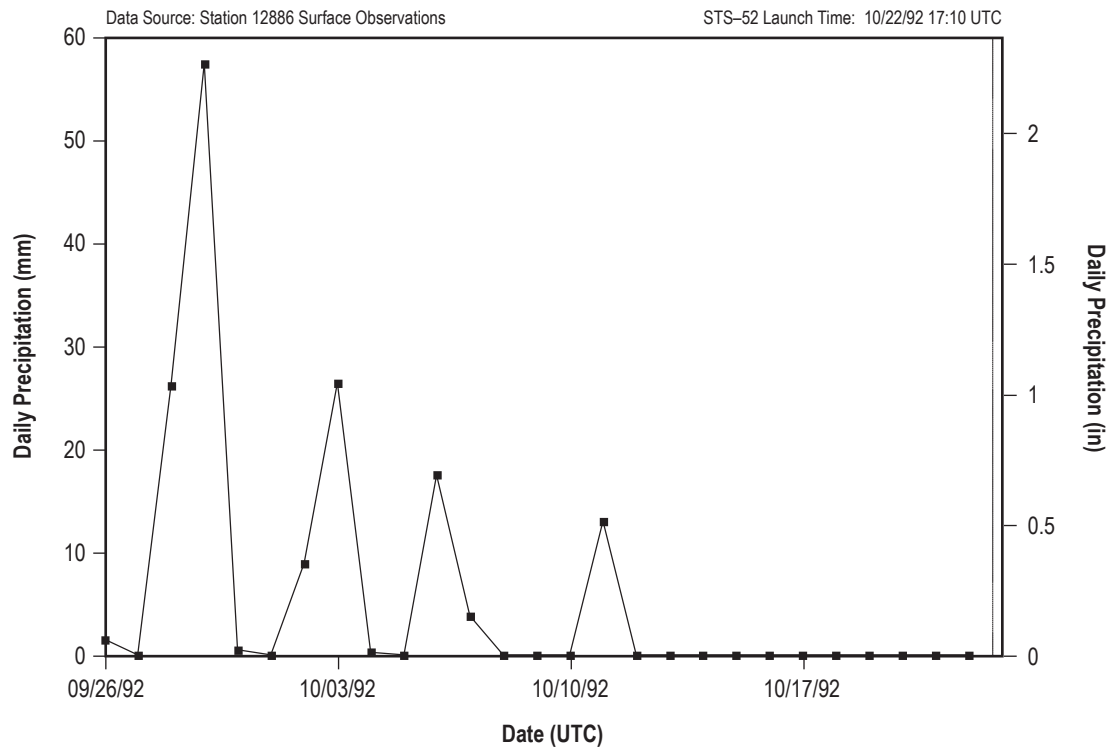


Figure 312. STS-52 daily precipitation totals.

## 5.52 STS-53

STS-53 was the 15th mission for *Discovery* (OV-103). It rolled out to pad 39A on November 8, 1992. STS-53 was exposed on the pad for 25 days and launched on December 2, 1992, at 13:24 UTC.

### 5.52.1 STS-53 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS-53.

### 5.52.2 STS-53 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-53 are shown in table 107. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 107. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 107. STS-53 L-0 surface observations.

Temperature	11.1 °C (52 °F)
Relative humidity	87%
Sea level pressure	1,020 hPa (30.12 inHg)
Wind speed	3.1 m/s (6.1 kt) (1-min average)
Wind direction	215° (1-min average)
Sky condition	2/8 altocumulus at 2,743 m (9,000 ft)
Visibility	12.9 km (6.9 nmi)

### 5.52.3 STS-53 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 313–318 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-53 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 108. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 108. STS-53 pad exposure period hourly extremes.

Minimum temperature	5 °C (41 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	32%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.2 hPa (29.89 inHg)
Maximum sea level pressure	1,025.7 hPa (30.29 inHg)
Maximum wind speed and associated wind direction	9.3 m/s (18 kt) 170°
Total precipitation	48.8 mm (1.92 in)

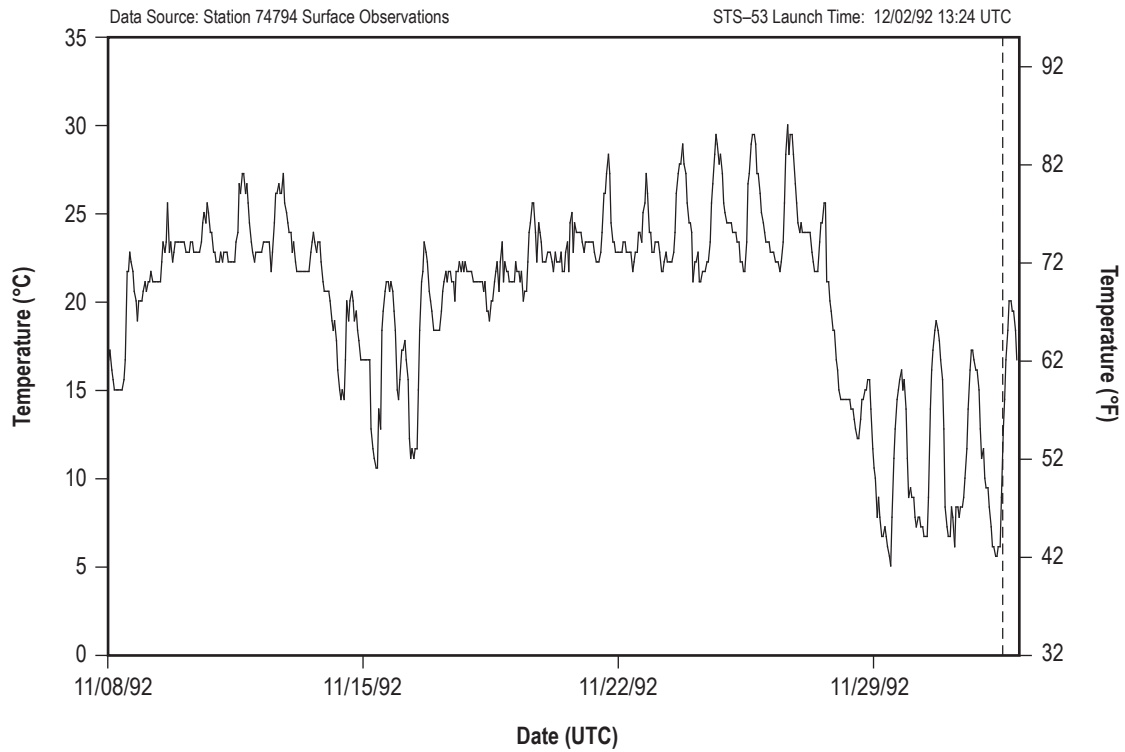


Figure 313. STS-53 hourly surface temperature.

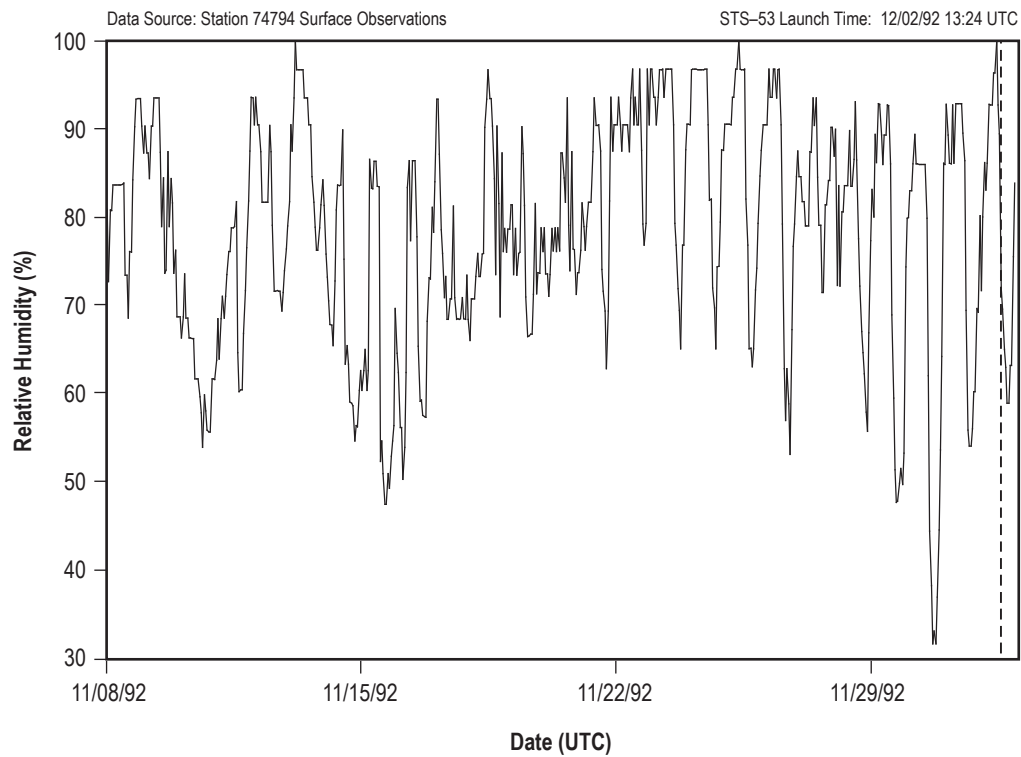


Figure 314. STS-53 hourly surface relative humidity.

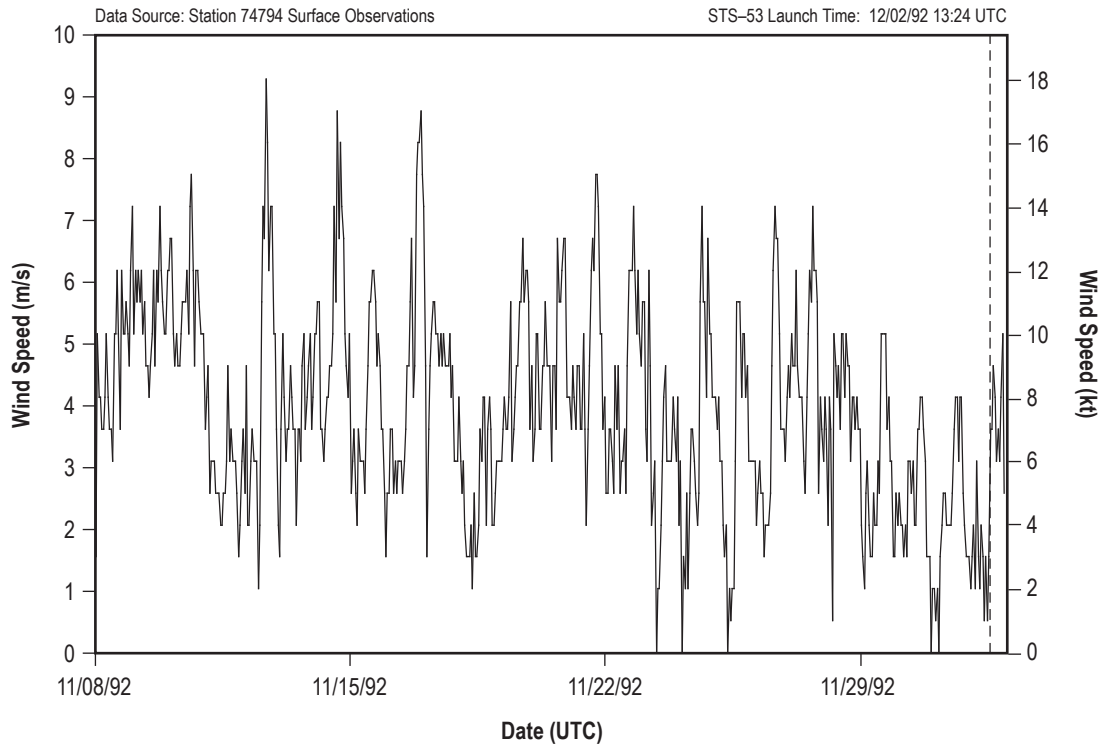


Figure 315. STS-53 hourly surface wind speed.

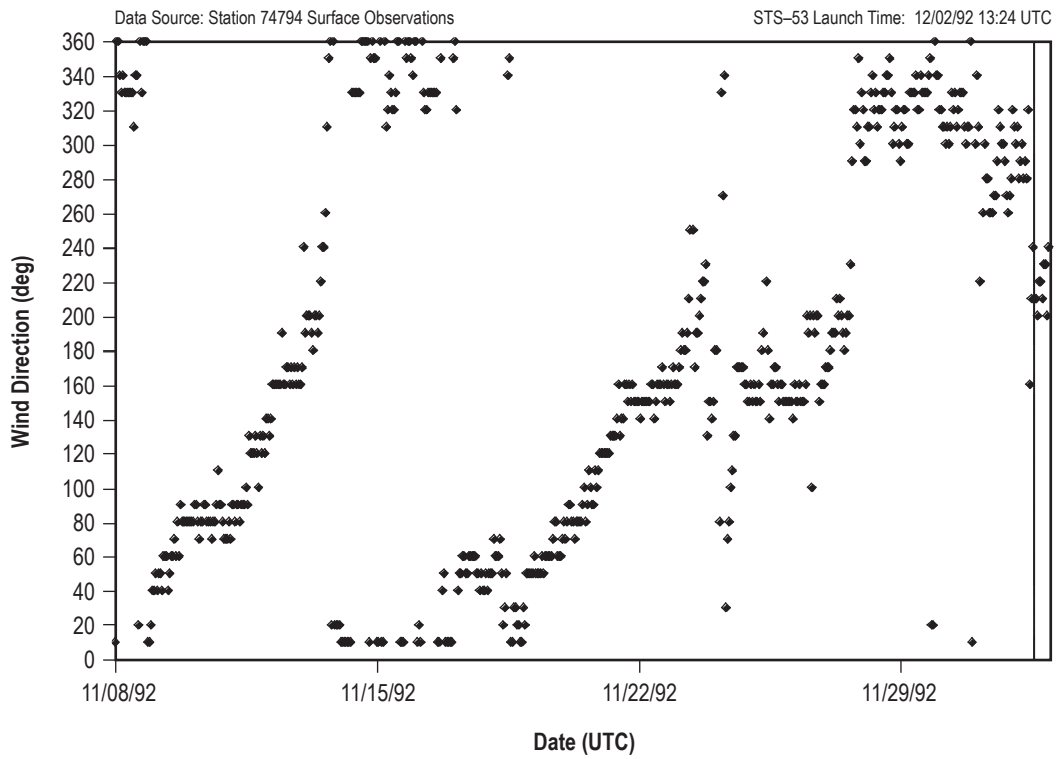


Figure 316. STS-53 hourly surface wind direction.



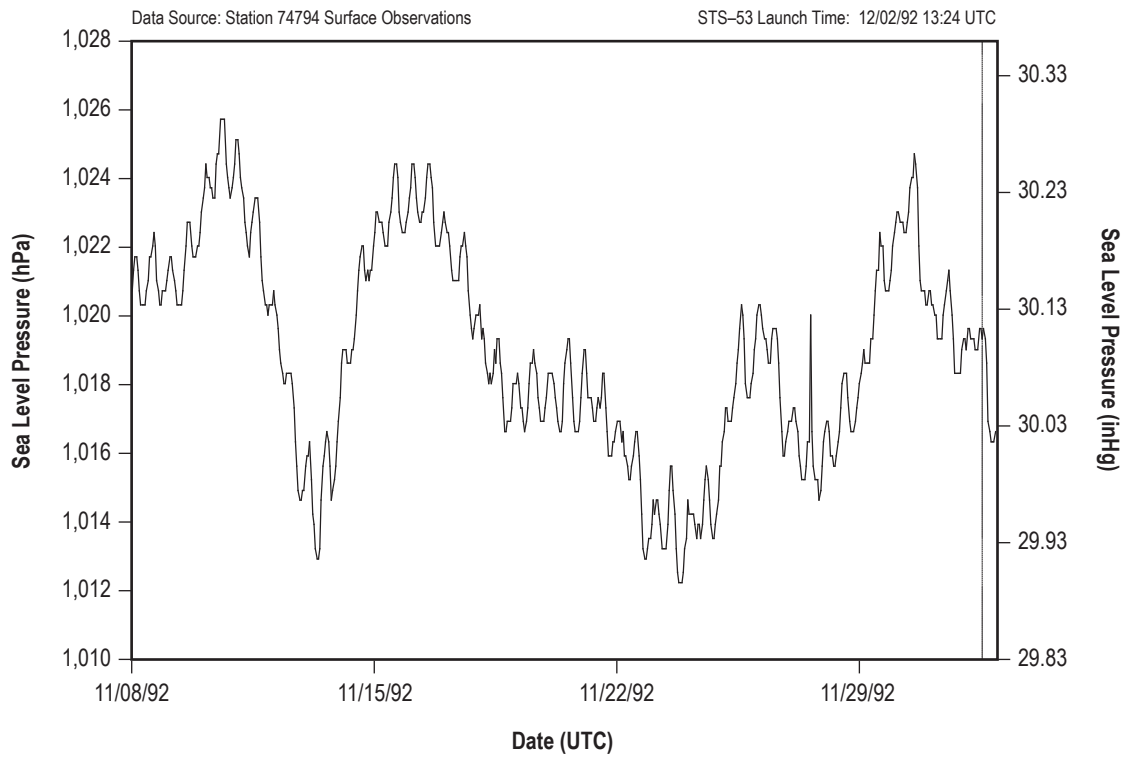


Figure 317. STS-53 hourly sea level pressure.

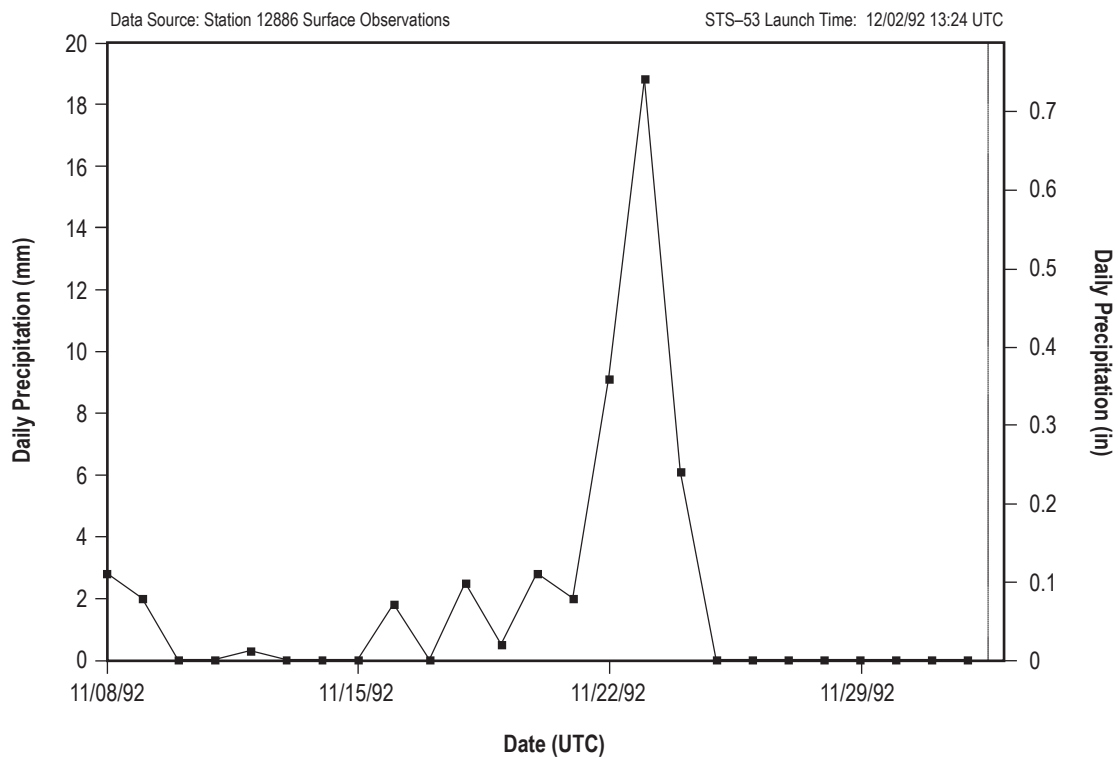


Figure 318. STS-53 daily precipitation totals.

## 5.53 STS-54

STS-54 was the third mission for *Endeavour* (OV-105). It rolled out to pad 39B on December 3, 1992. STS-54 was exposed on the pad for 42 days and launched on January 13, 1993, at 13:59 UTC.

### 5.53.1 STS-54 Pad Exposure Period Data Archive Sources

Only data from station 74794 have been archived for the pad exposure period for STS-54.

### 5.53.2 STS-54 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-54 are shown in table 109. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 109. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 109. STS-54 L-0 surface observations.

Temperature	21.1 °C (70 °F)
Relative humidity	94%
Sea level pressure	1,022 hPa (30.18 inHg)
Wind speed	2.9 m/s (5.7 kt) (1-min average)
Wind direction	180° (1-min average)
Sky condition	2/8 stratocumulus at 1,524 m (5,000 ft); 1/8 altocumulus at 1,981 m (6,500 ft)
Visibility	14.5 km (7.8 nmi)

### 5.53.3 STS-54 Pad Exposure Period Hourly Surface Meteorological Parameters

Figures 319–324 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-54 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 110. All data in this section were collected at station 74794 except precipitation, which was measured at station 12886.

Table 110. STS-54 pad exposure period hourly extremes.

Minimum temperature	3.3 °C (38 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	33%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,027.1 hPa (30.33 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 300°
Total precipitation	69.1 mm (2.72 in)

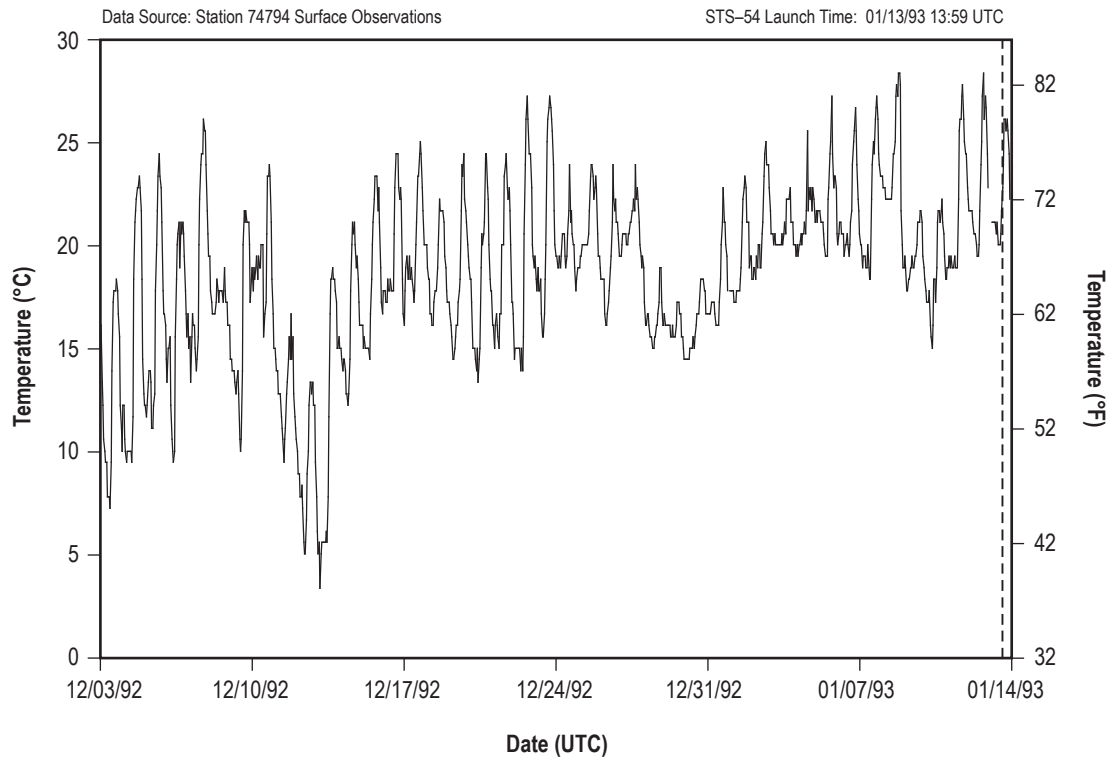


Figure 319. STS-54 hourly surface temperature.

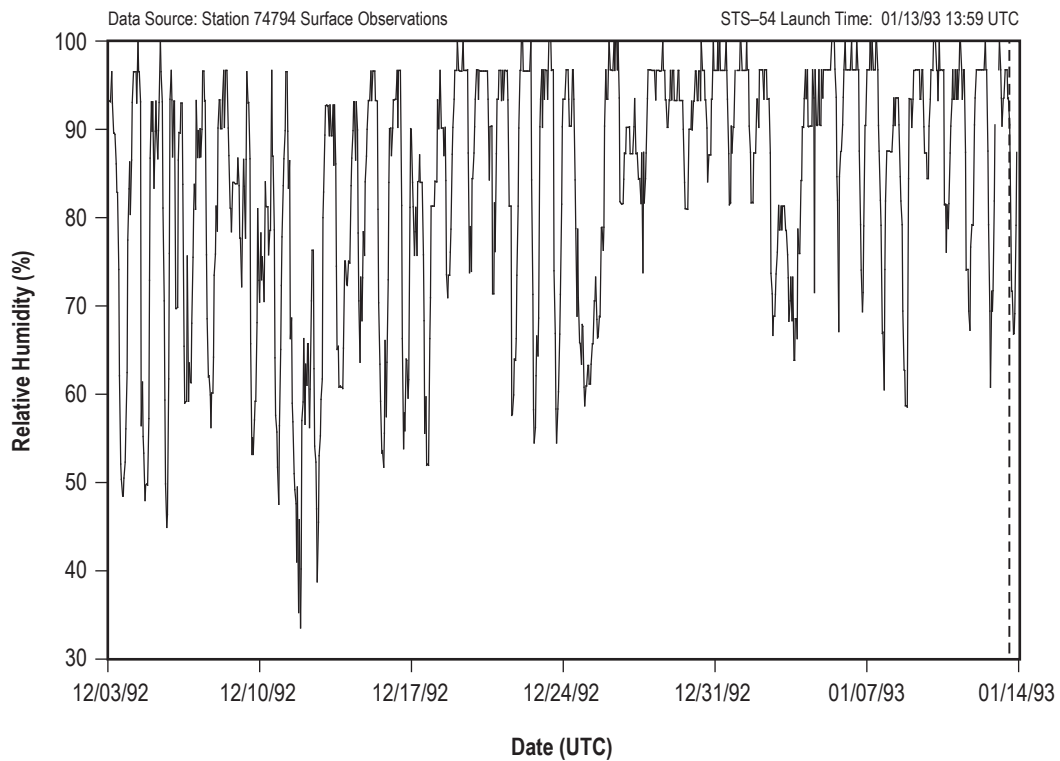


Figure 320. STS-54 hourly surface relative humidity.

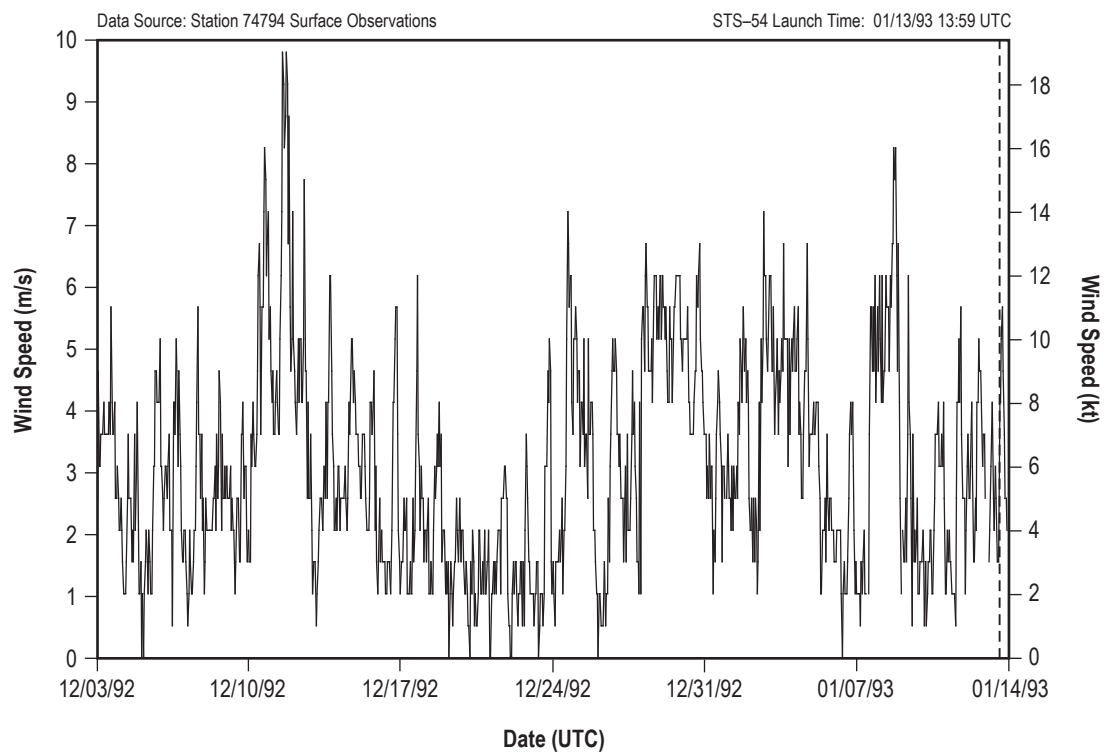


Figure 321. STS-54 hourly surface wind speed.

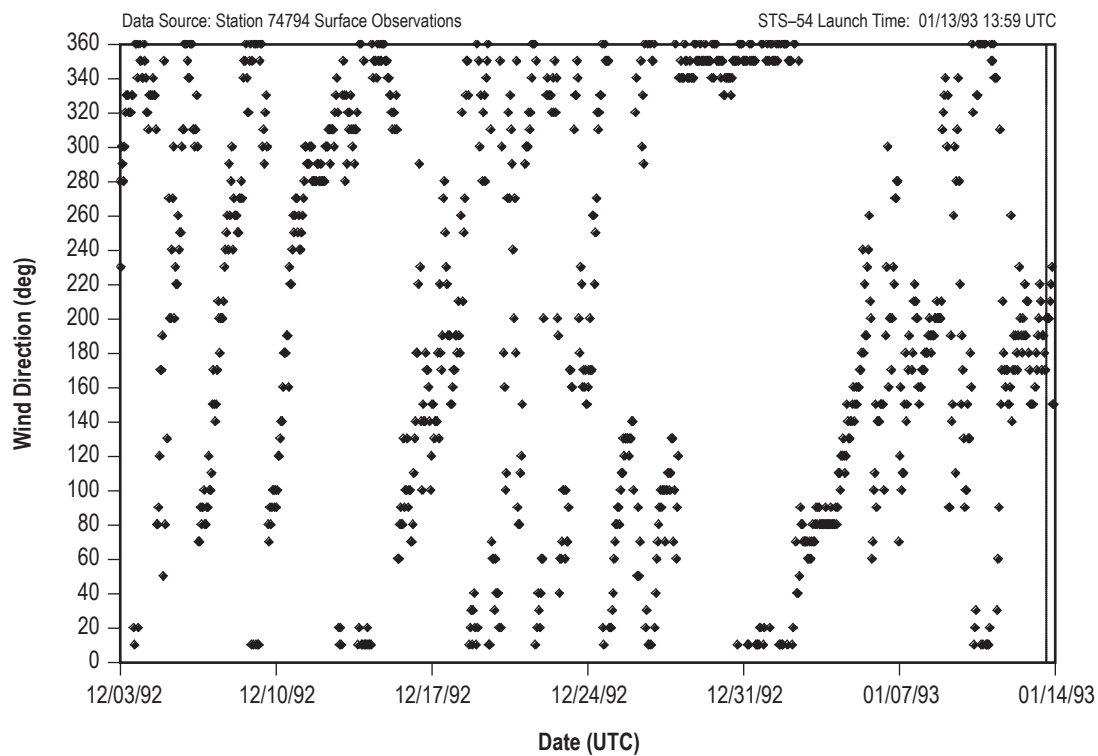


Figure 322. STS-54 hourly surface wind direction.

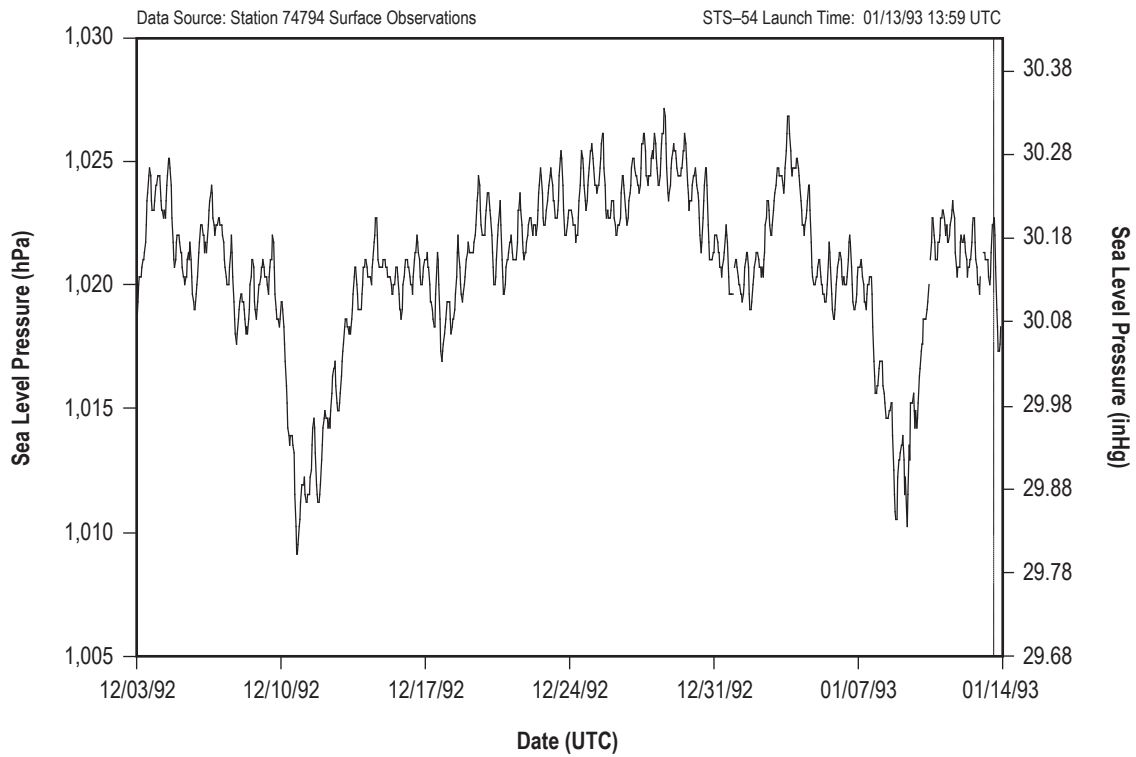


Figure 323. STS-54 hourly sea level pressure.

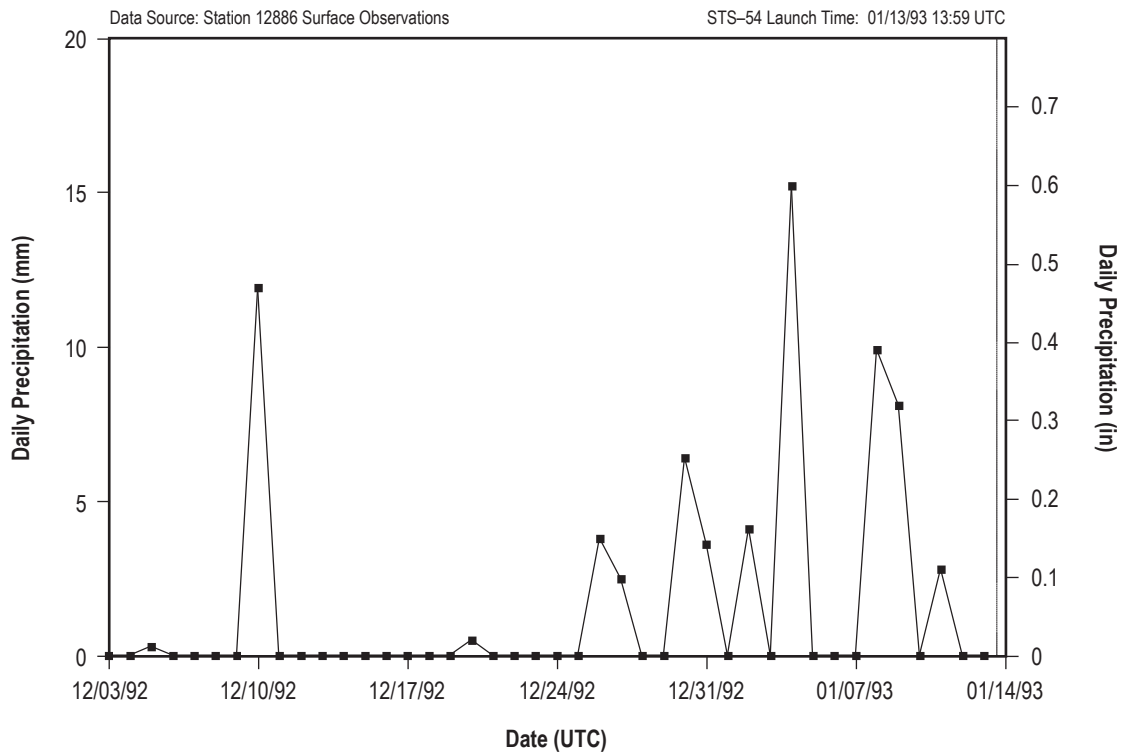


Figure 324. STS-54 daily precipitation totals.

## 5.54 STS-56

STS-56 was the 16th mission for *Discovery* (OV-103). It rolled out to pad 39B on March 15, 1993. STS-56 was exposed on the pad for 24 days and launched on April 8, 1993, at 05:29 UTC.

### 5.54.1 STS-56 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS-56 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were not archived for this mission.

### 5.54.2 STS-56 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-56 are shown in table 111. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at Cape Canaveral Air Force station (XMR). Pressure has been adjusted to sea level in table 111.

Table 111. STS-56 L-0 surface observations.

Temperature	18.3 °C (64.9 °F)
Relative humidity	74%
Sea level pressure	1,017.3 hPa (30.04 inHg)
Wind speed	5.1 m/s (9.9 kt) (1-min average)
Wind direction	65° (1-min average)
Sky condition	1/8 stratocumulus at 1,676 m (5,500 ft)
Visibility	16.1 km (8.7 nmi)

### 5.54.3 STS-56 Pad Exposure Period Hourly Meteorological Parameters

Figures 325–330 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-56 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 112. Temperature and relative humidity data in this section are from MET tower 3131 (the only source available for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Pressure data were not archived for this mission. Precipitation was measured at station 12886.

Table 112. STS-56 pad exposure period hourly extremes.

Minimum temperature	1.7 °C (35 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	29%
Maximum relative humidity	96%
Minimum sea level pressure	NA
Maximum sea level pressure	NA
Maximum wind speed and associated wind direction	19 m/s (37 kt) 20°
Total precipitation	35.8 mm (1.41 in)

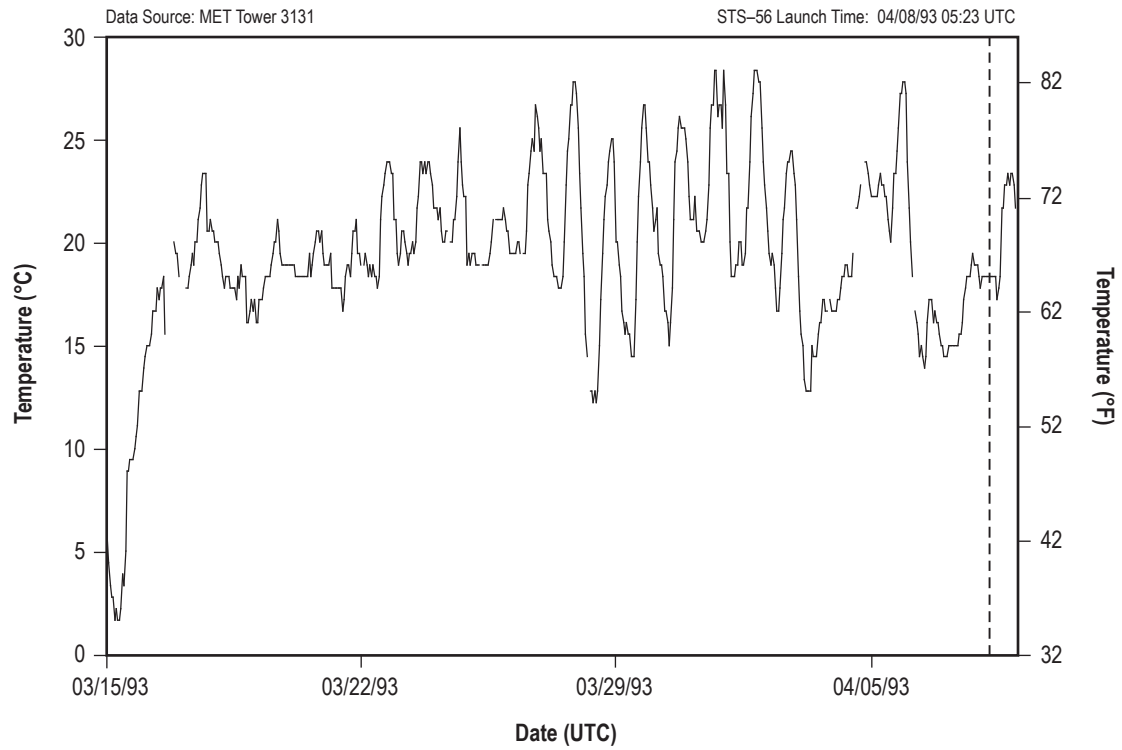


Figure 325. STS-56 hourly surface temperature.

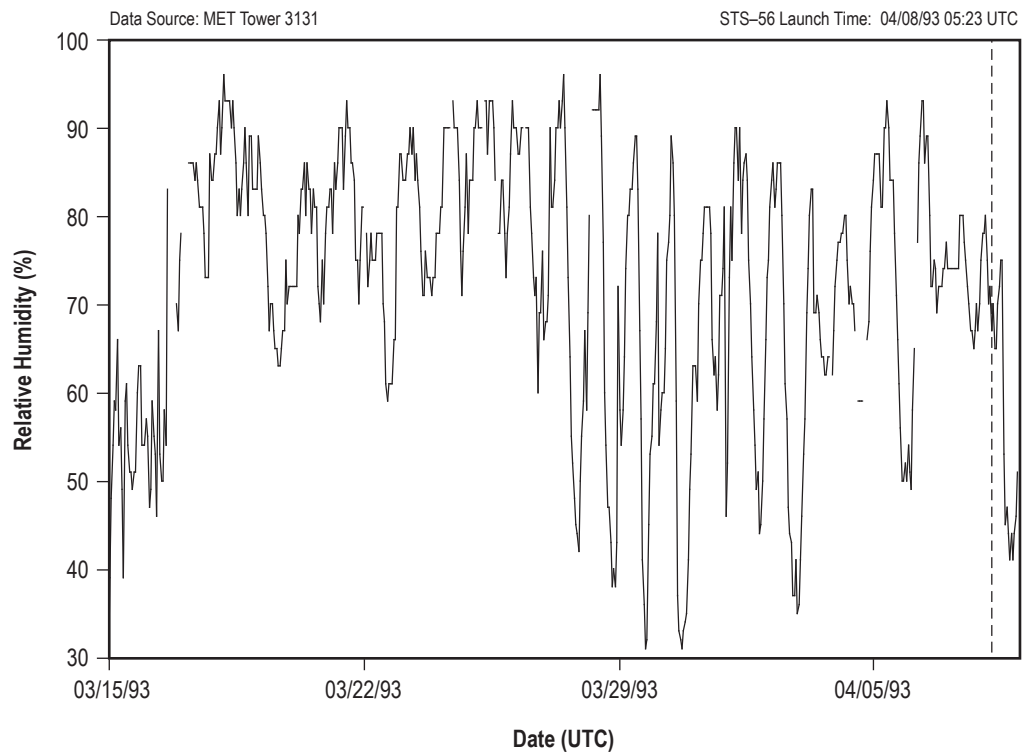


Figure 326. STS-56 hourly surface relative humidity.

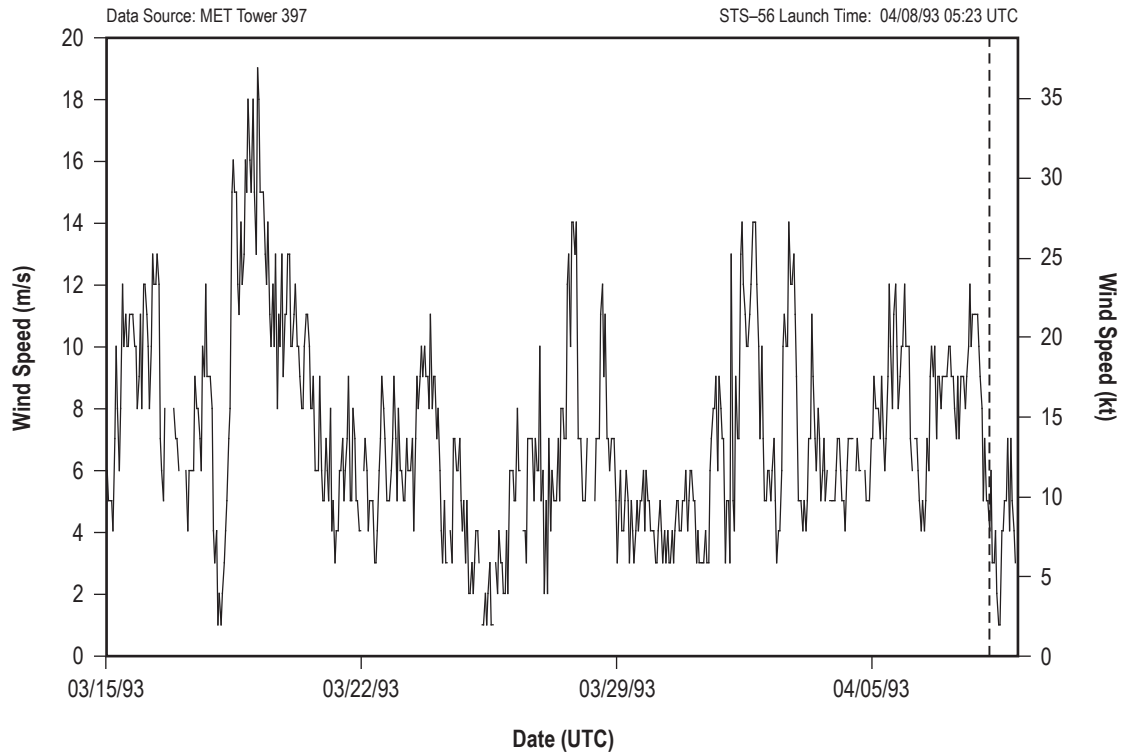


Figure 327. STS-56 hourly surface wind speed.

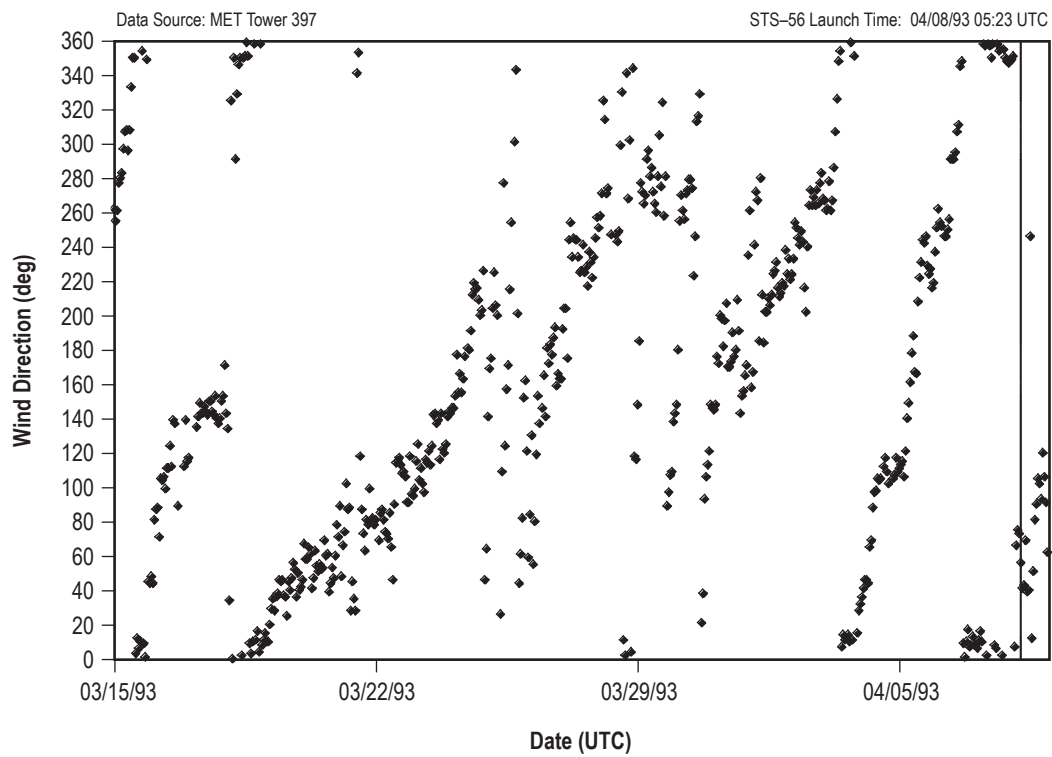


Figure 328. STS-56 hourly surface wind direction.



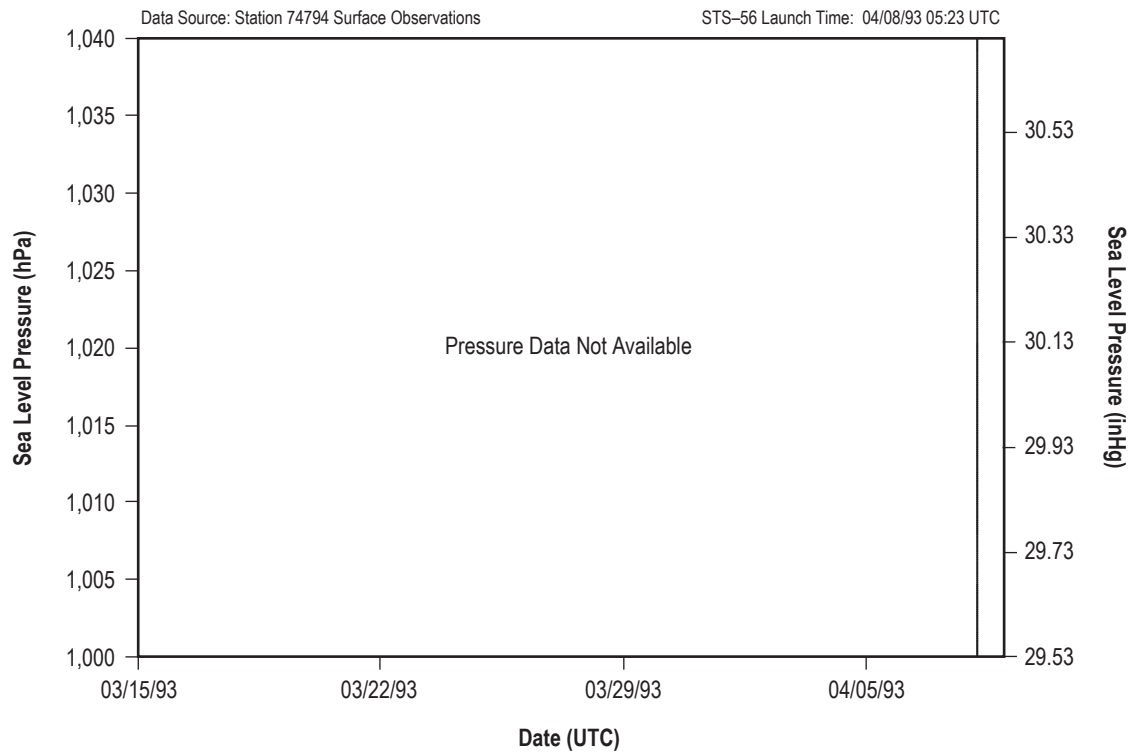


Figure 329. STS-56 hourly sea level pressure.

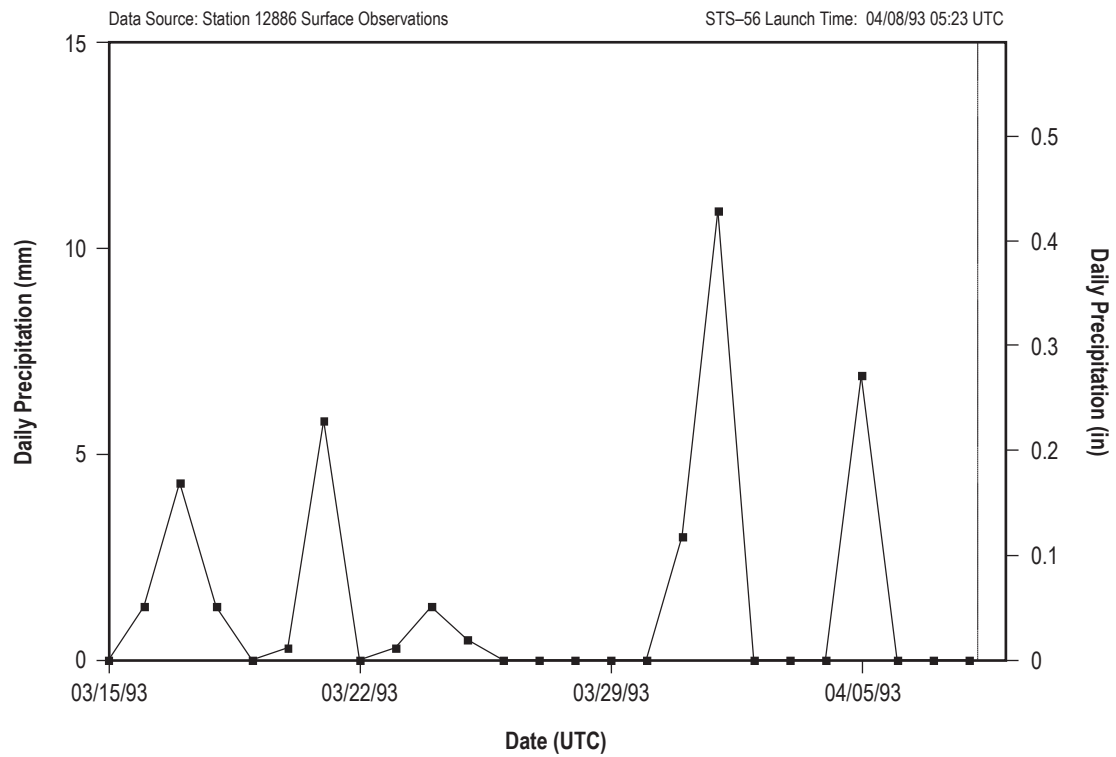


Figure 330. STS-56 daily precipitation totals.

## 5.55 STS–55

STS–55 was the 14th mission for *Columbia* (OV–102). It rolled out to pad 39A on February 8, 1993. STS–55 was exposed on the pad for 78 days and launched on April 26, 1993, at 14:50 UTC.

### 5.55.1 STS–55 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–55 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.55.2 STS–55 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–55 are shown in table 113. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 113. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 113. STS–55 L–0 surface observations.

Temperature	25 °C (77 °F)
Relative humidity	70%
Sea level pressure	1,019.2 hPa (30.1 inHg)
Wind speed	6.2 m/s (12 kt) (1-min average)
Wind direction	173° (1-min average)
Sky condition	2/8 cumulus at 884 m (2,900 ft); 2/8 altocumulus at 2,591 m (8,500 ft); 5/8 cirrostratus at 7,315 m (24,000 ft)
Visibility	9.6 km (5.2 nmi)

### 5.55.3 STS–55 Pad Exposure Period Hourly Meteorological Parameters

Figures 331–336 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–55 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 114. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 393 (the closest available to the pad) at the 18-m (60-ft) level. Limited pressure data were measured at station 74794. Precipitation was measured at station 12886.

Table 114. STS–55 pad exposure period hourly extremes.

Minimum temperature	–1.1 °C (30 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	19%
Maximum relative humidity	96%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,024 hPa (30.24 inHg)
Maximum wind speed and associated wind direction	25.2 m/s (49 kt) 218°
Total precipitation	184.2 mm (7.25 in)

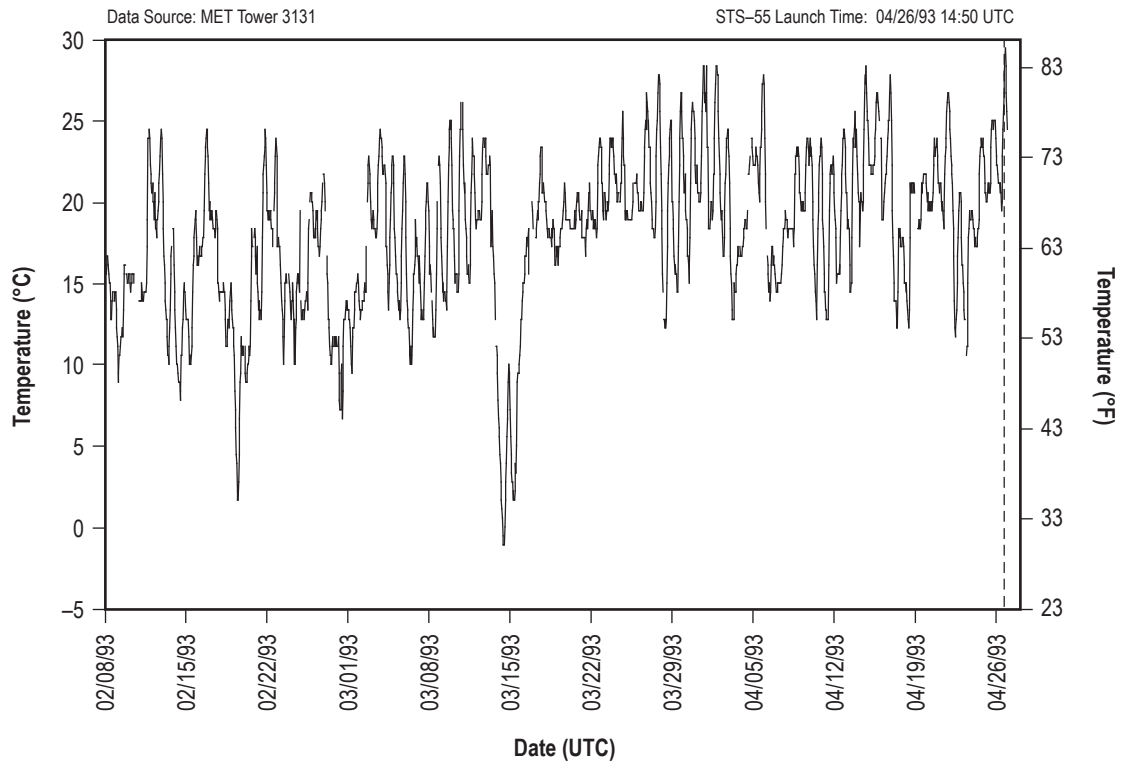


Figure 331. STS-55 hourly surface temperature.

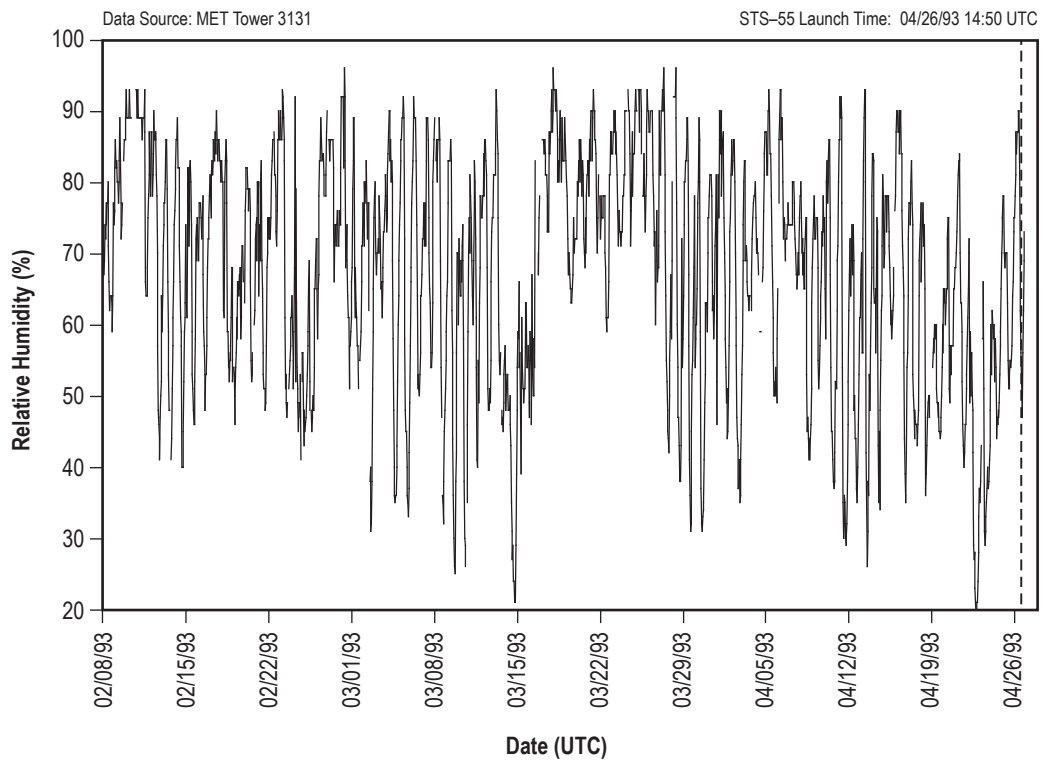


Figure 332. STS-55 hourly surface relative humidity.

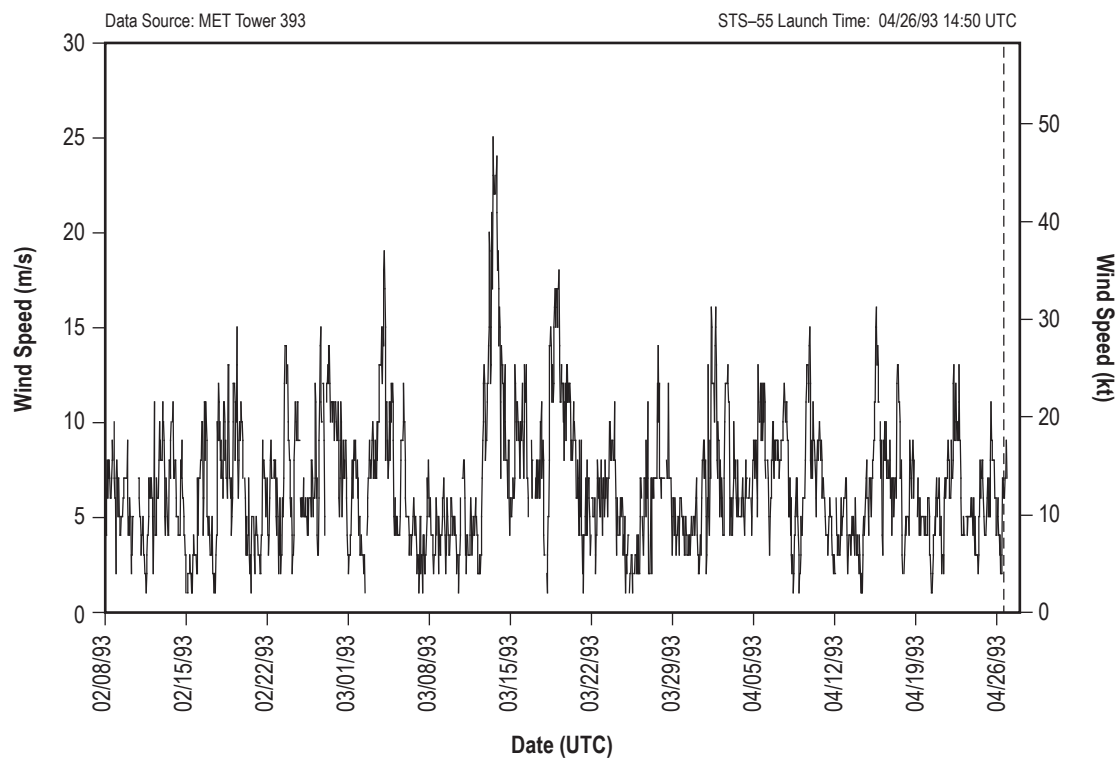


Figure 333. STS-55 hourly surface wind speed.

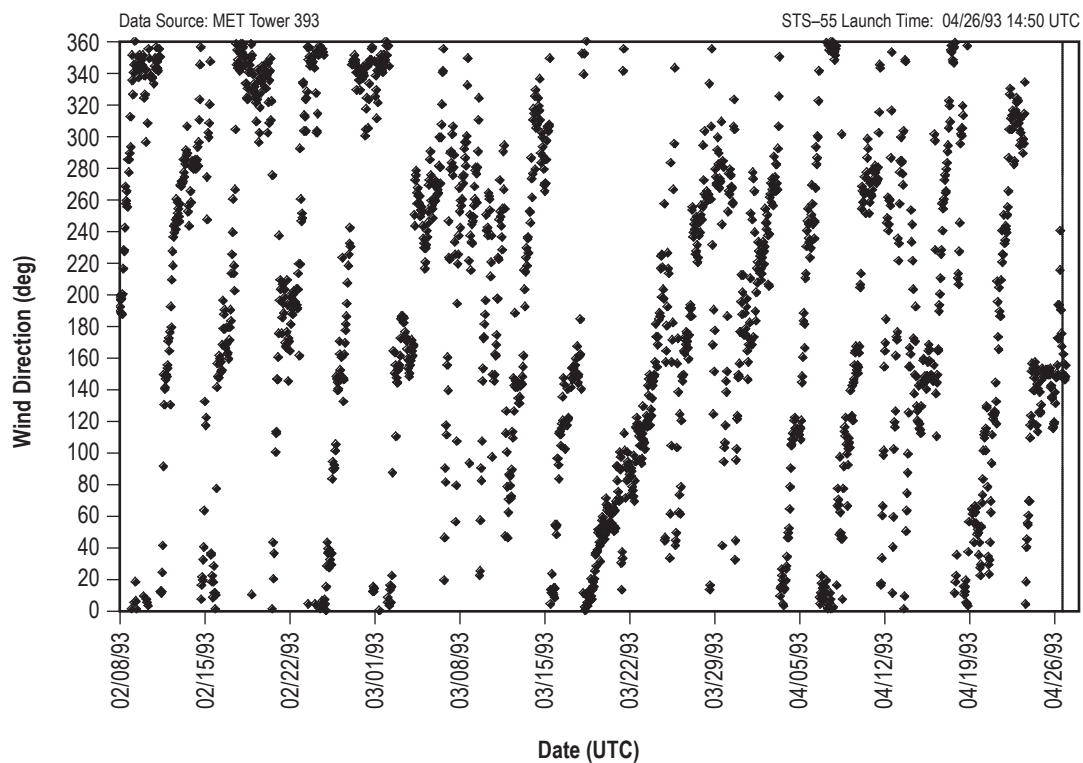


Figure 334. STS-55 hourly surface wind direction.

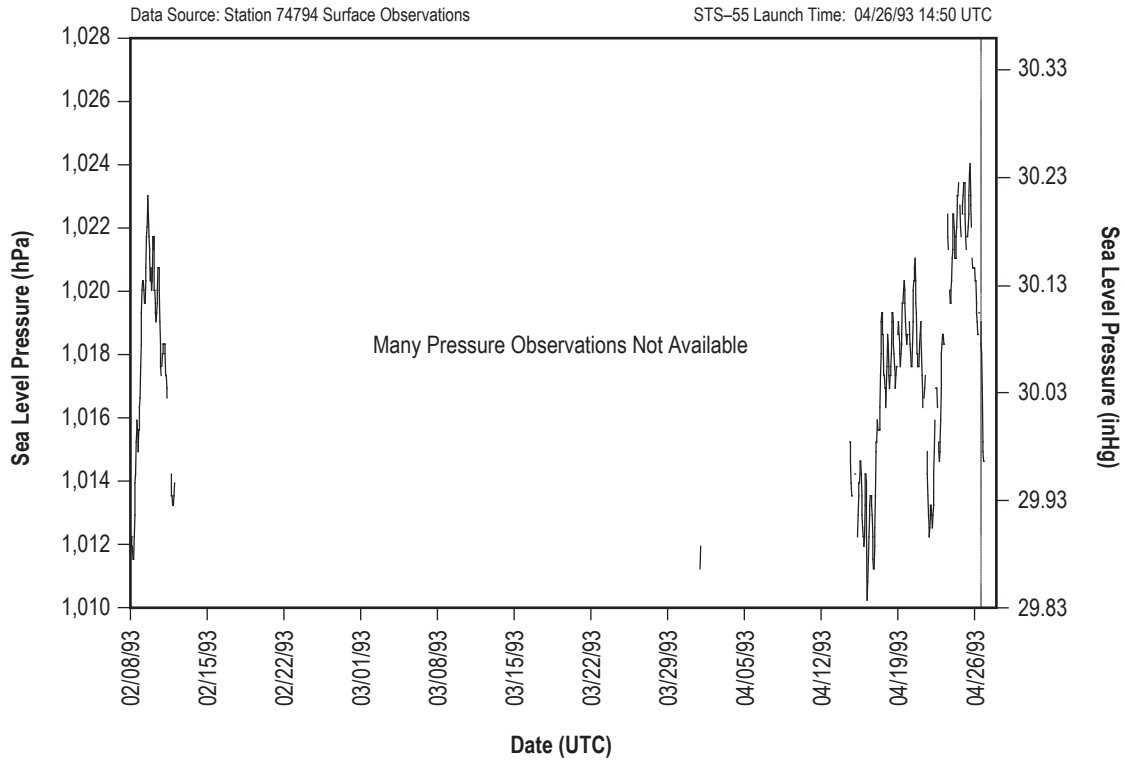


Figure 335. STS-55 hourly sea level pressure.

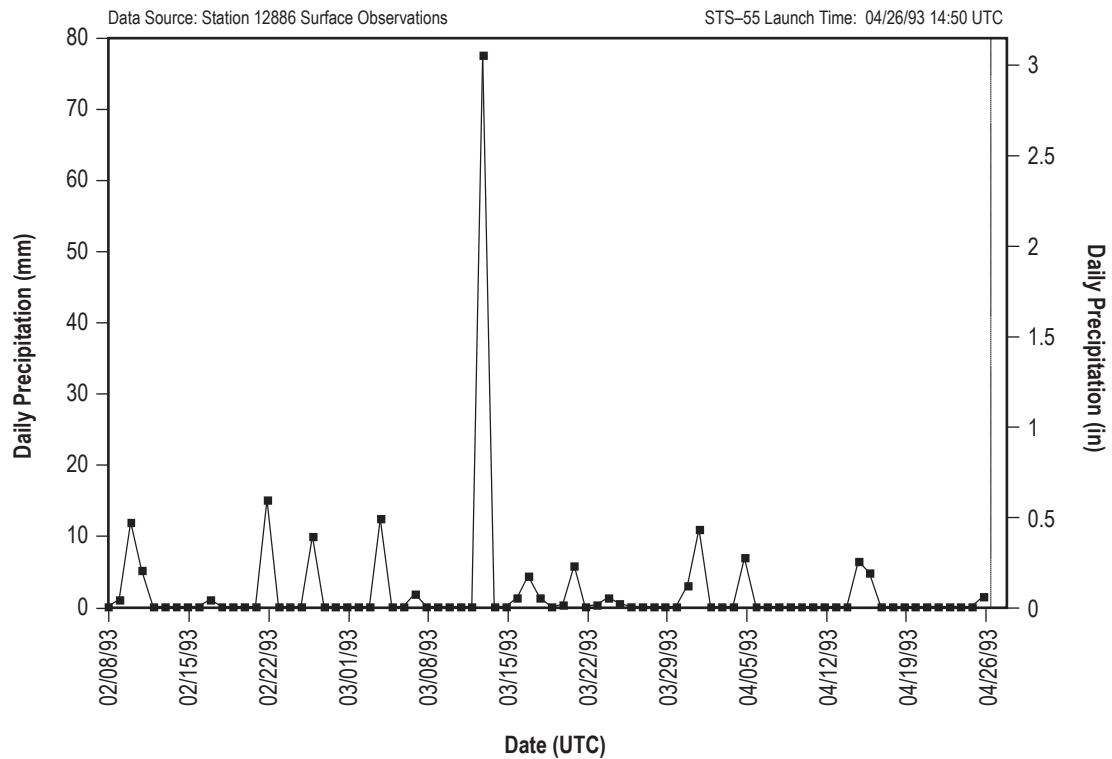


Figure 336. STS-55 daily precipitation totals.

## 5.56 STS-57

STS-57 was the fourth mission for *Endeavour* (OV-105). It rolled out to pad 39B on April 28, 1993. STS-57 was exposed on the pad for 55 days and launched on June 21, 1993, at 13:07 UTC.

### 5.56.1 STS-57 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS-57 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.56.2 STS-57 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-57 are shown in table 115. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 115. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 115. STS-57 L-0 surface observations.

Temperature	28.3 °C (83 °F)
Relative humidity	65%
Sea level pressure	1,019.1 hPa (30.09 inHg)
Wind speed	3.1 m/s (6 kt) (1-min average)
Wind direction	91° (1-min average)
Sky condition	3/8 cumulus at 762 m (2,500 ft); 2/8 cirrostratus at 7,010 m (23,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.56.3 STS-57 Pad Exposure Period Hourly Meteorological Parameters

Figures 337–342 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-57 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 116. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Sea level pressure was measured at station 74794. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Precipitation was measured at station 12886.

Table 116. STS-57 pad exposure period hourly extremes.

Minimum temperature	17.8 °C (64 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	33%
Maximum relative humidity	96%
Minimum sea level pressure	1,006.4 hPa (29.72 inHg)
Maximum sea level pressure	1,023.7 hPa (30.23 inHg)
Maximum wind speed and associated wind direction	13.9 m/s (27 kt) 46°
Total precipitation	14.2 mm (0.56 in)

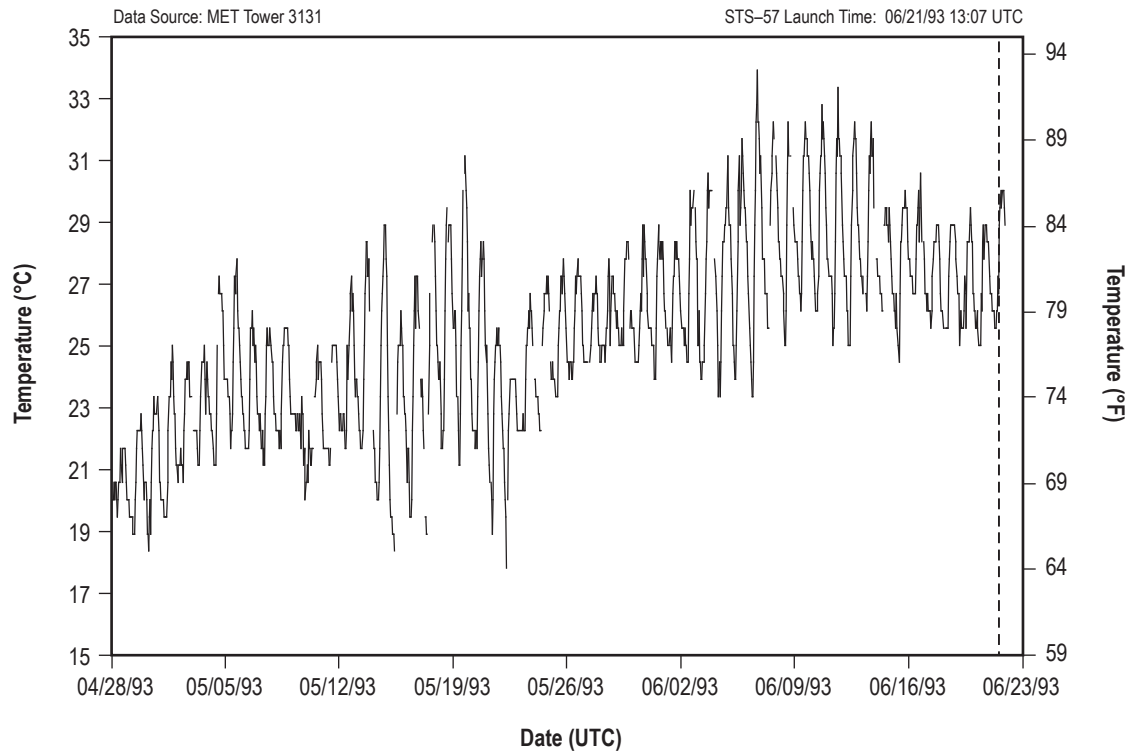


Figure 337. STS-57 hourly surface temperature.

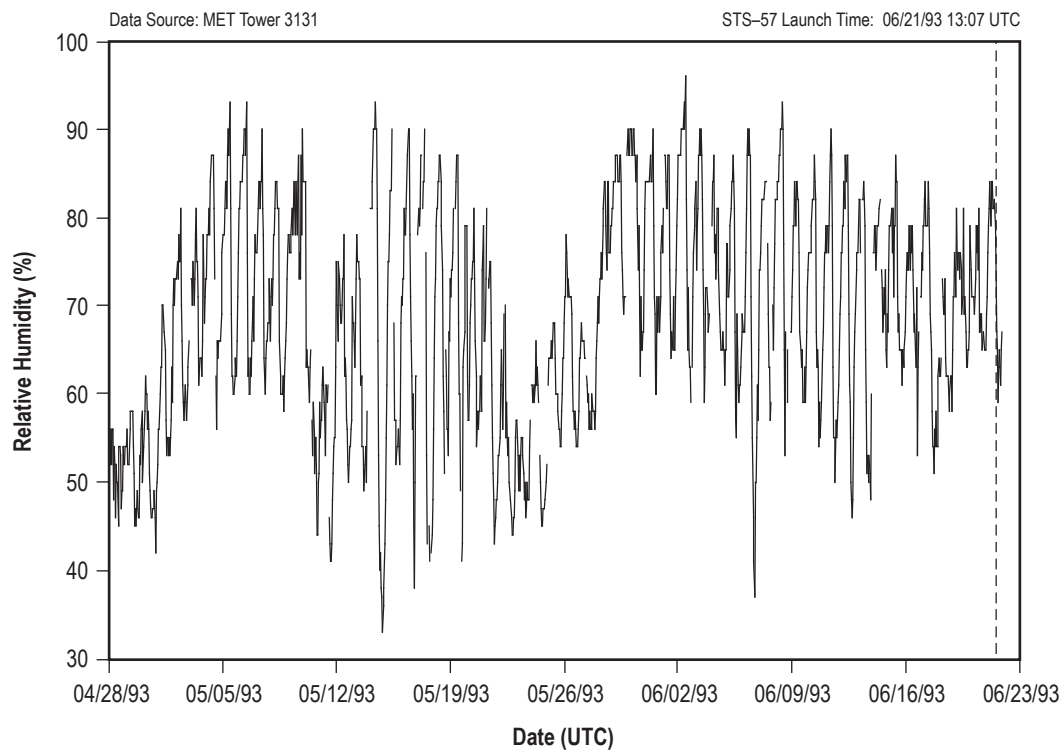


Figure 338. STS-57 hourly surface relative humidity.

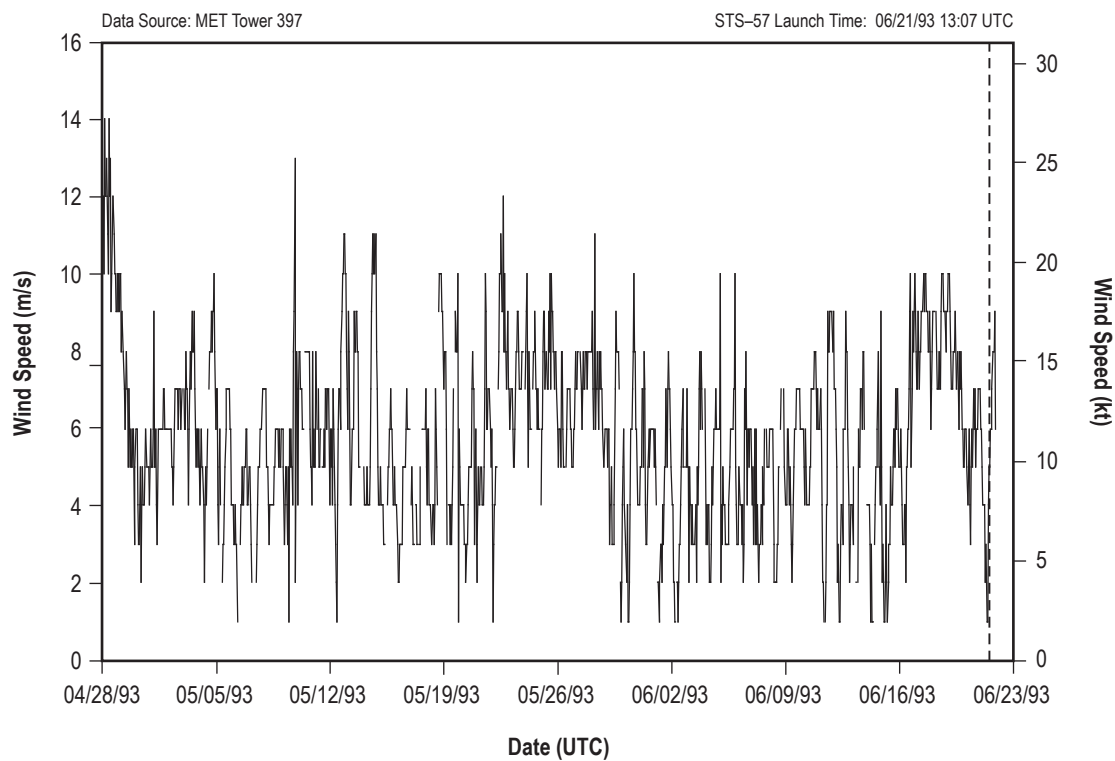


Figure 339. STS-57 hourly surface wind speed.

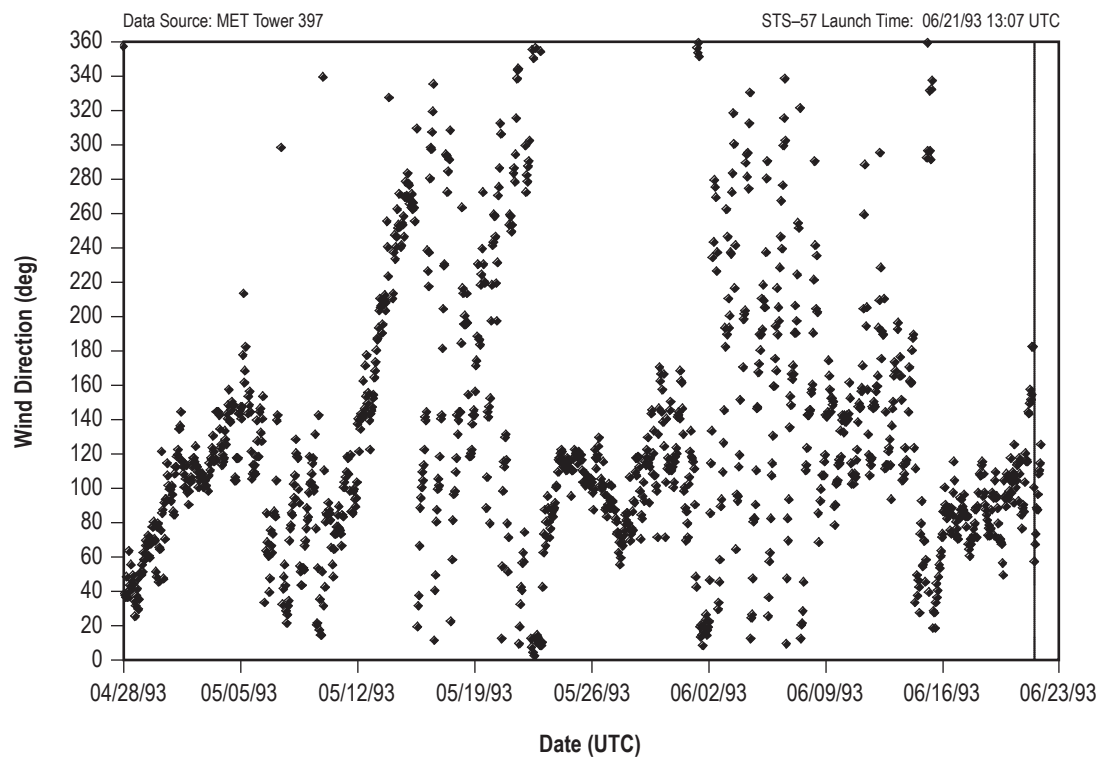


Figure 340. STS-57 hourly surface wind direction.



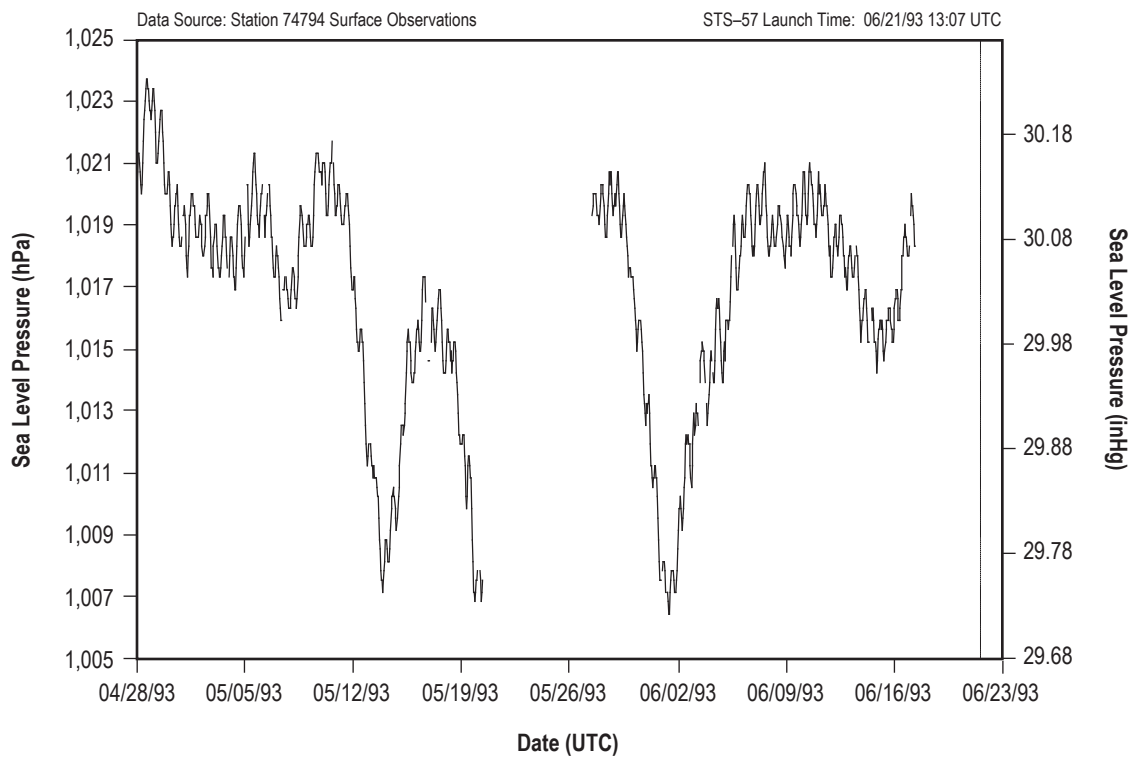


Figure 341. STS-57 hourly sea level pressure.

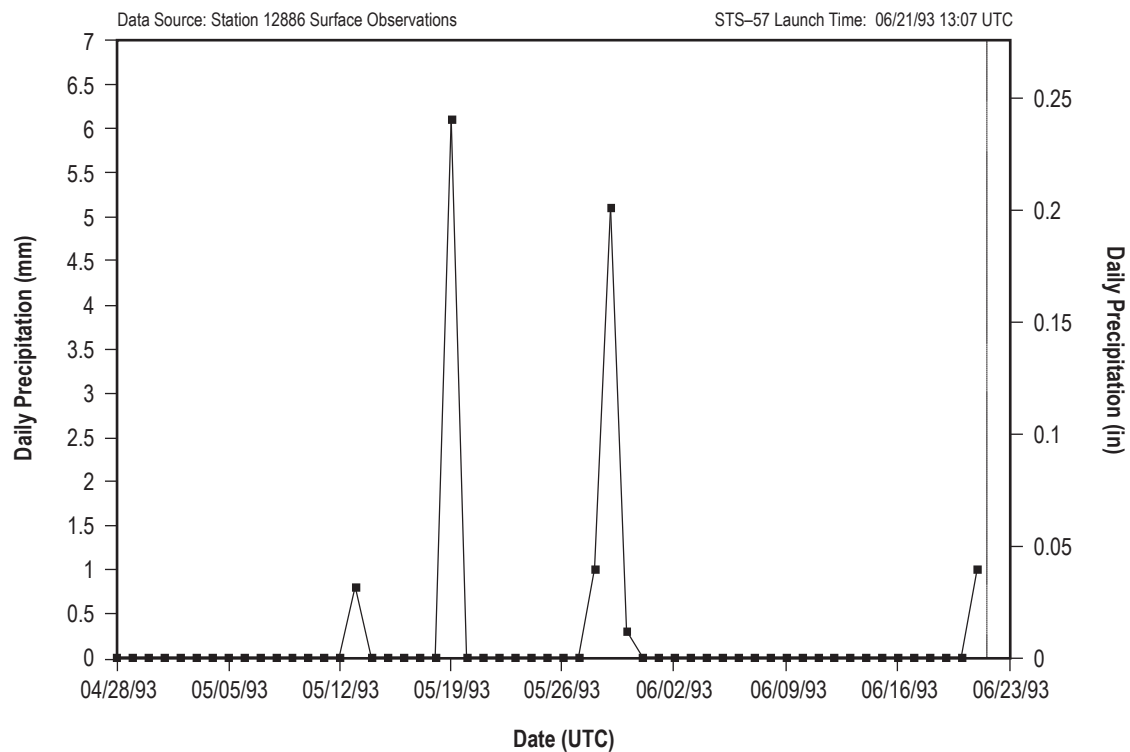


Figure 342. STS-57 daily precipitation totals.

## 5.57 STS–51

STS–51 was the 17th mission for *Discovery* (OV–103). It rolled out to pad 39B on June 26, 1993. STS–51 was exposed on the pad for 78 days and launched on September 12, 1993, at 11:45 UTC.

### 5.57.1 STS–51 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–57 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.57.2 STS–51 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–51 are shown in table 117. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 117.

Table 117. STS–51 L–0 surface observations.

Temperature	22.8 °C (73 °F)
Relative humidity	98%
Sea level pressure	1,020 hPa (30.12 inHg)
Wind speed	2 m/s (3.8 kt) (1-min average)
Wind direction	294° (1-min average)
Sky condition	1/8 cumulonimbus at 671 m (2,200 ft); 1/8 altocumulus at 2,134 m (7,000 ft); 1/8 cirrus at 9,144 m (30,000 ft)
Visibility	14.5 km (7.8 nmi)

### 5.57.3 STS–51 Pad Exposure Period Hourly Meteorological Parameters

Figures 343–348 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–51 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 118. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Sea level pressure was measured at station 74794. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Precipitation was measured at station 12886.

Table 118. STS–51 pad exposure period hourly extremes.

Minimum temperature	22.2 °C (72 °F)
Maximum temperature	36.7 °C (98 °F)
Minimum relative humidity	38%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.9 hPa (29.91 inHg)
Maximum sea level pressure	1,024.4 hPa (30.25 inHg)
Maximum wind speed and associated wind direction	13.9 m/s (27 kt) 15°
Total precipitation	356.9 mm (14.05 in)

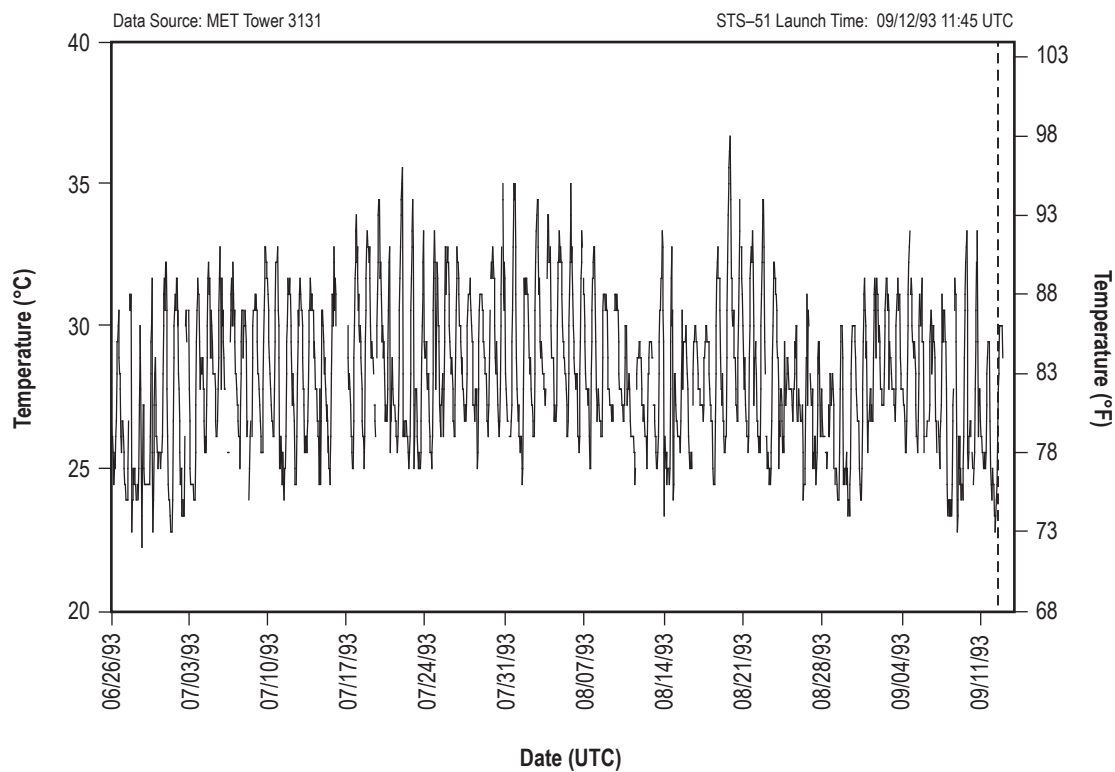


Figure 343. STS-51 hourly surface temperature.

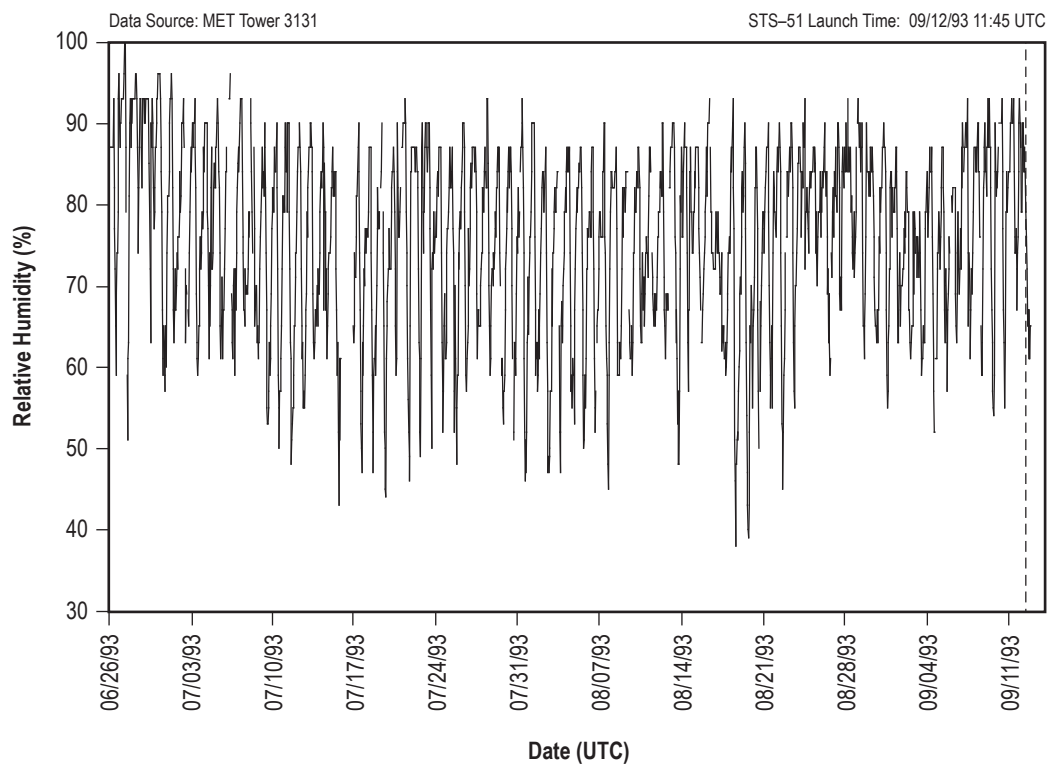


Figure 344. STS-51 hourly surface relative humidity.

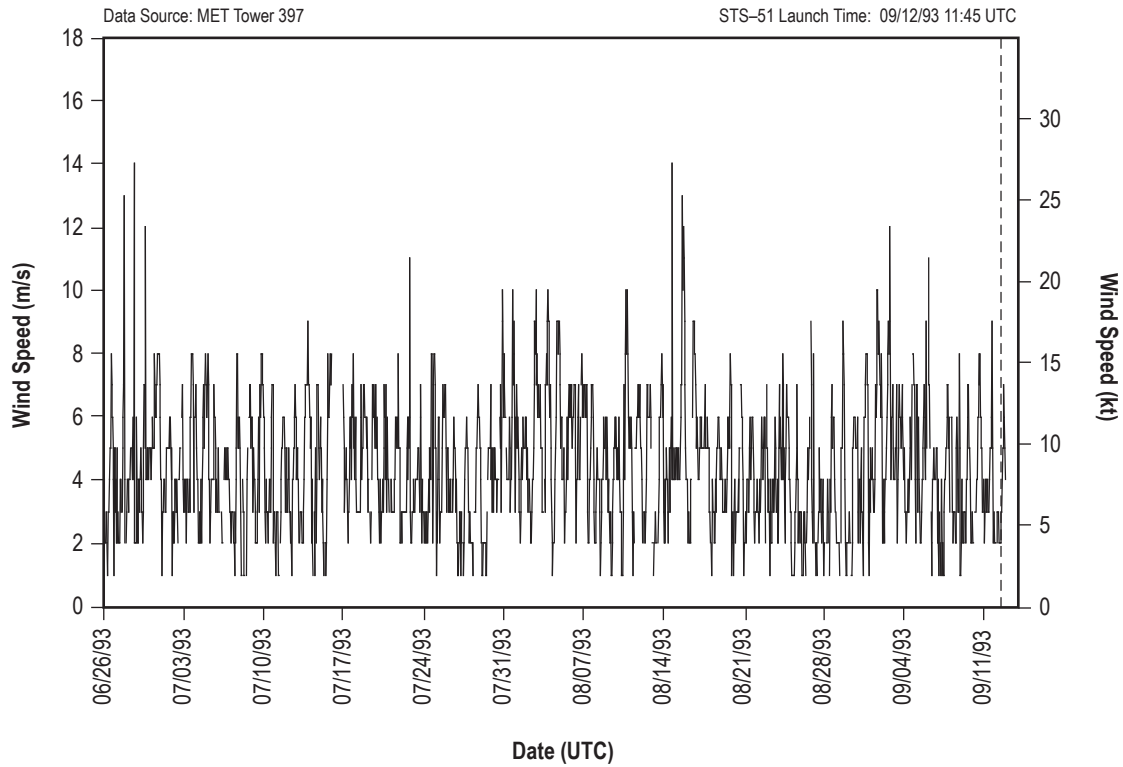


Figure 345. STS-51 hourly surface wind speed.

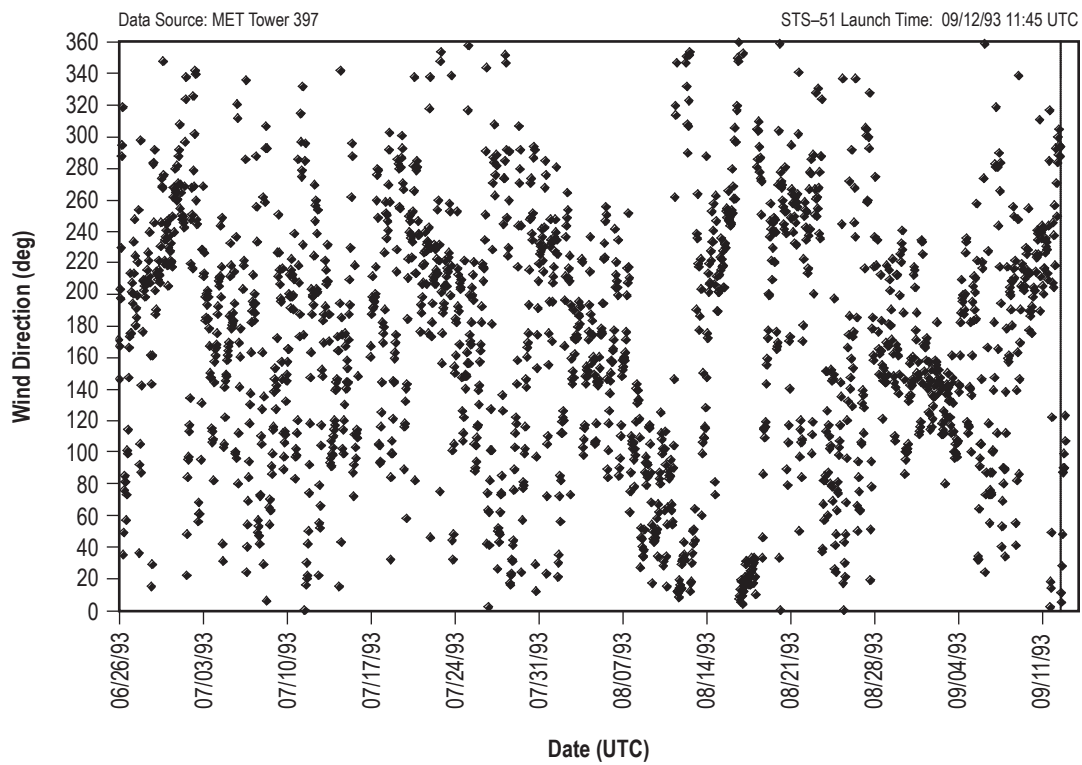


Figure 346. STS-51 hourly surface wind direction.

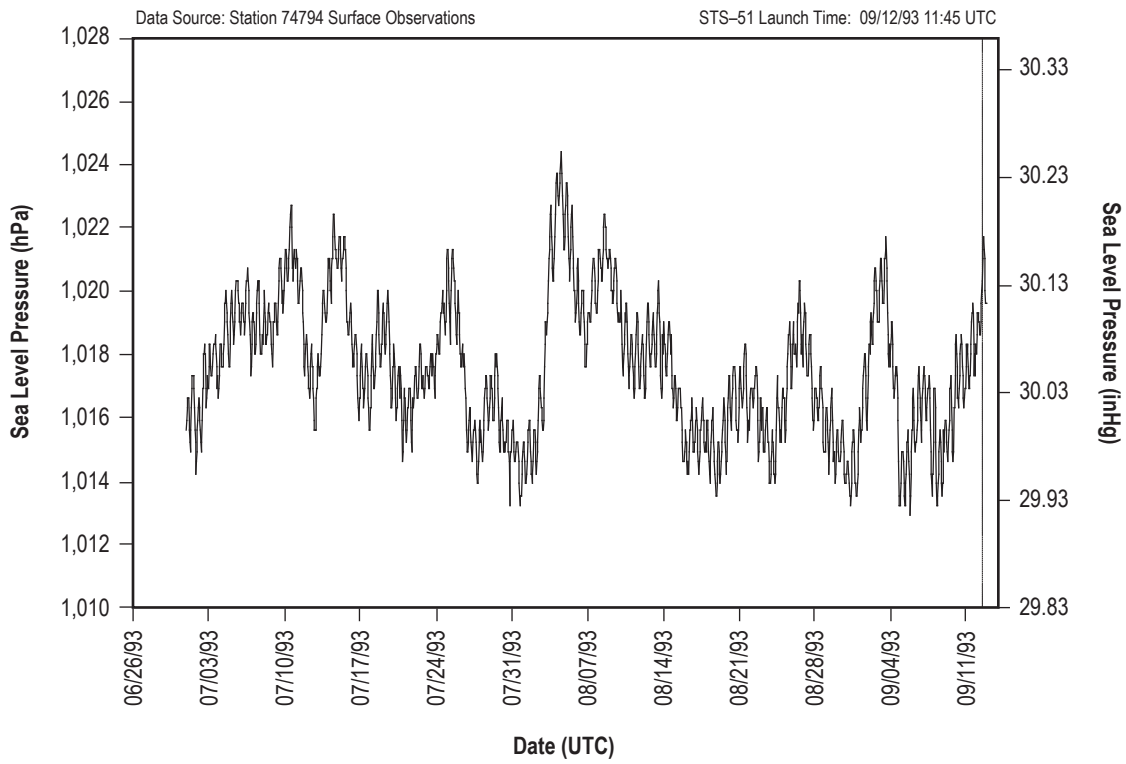


Figure 347. STS-51 hourly sea level pressure.

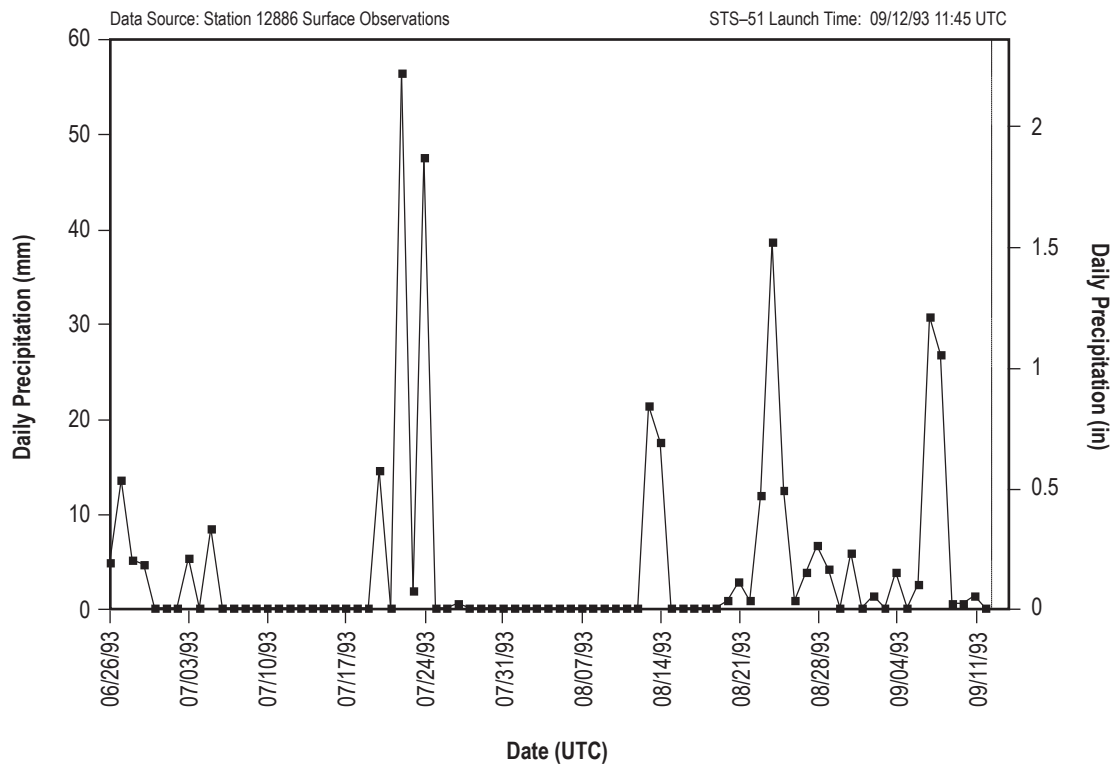


Figure 348. STS-51 daily precipitation totals.

## 5.58 STS-58

STS-58 was the 15th mission for *Columbia* (OV-102). It rolled out to pad 39B on September 17, 1993. STS-58 was exposed on the pad for 32 days and launched on October 18, 1993, at 14:53 UTC.

### 5.58.1 STS-58 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS-58 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.58.2 STS-58 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-58 are shown in table 119. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 119.

Table 119. STS-58 L-0 surface observations.

Temperature	25.6 °C (78 °F)
Relative humidity	72%
Sea level pressure	1,017.3 hPa (30.04 inHg)
Wind speed	3.2 m/s (6.3 kt) (1-min average)
Wind direction	316° (1-min average)
Sky condition	3/8 cumulus at 610 m (2,000 ft); 1/8 stratocumulus at 914 m (3,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.58.3 STS-58 Pad Exposure Period Hourly Meteorological Parameters

Figures 349–354 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-58 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 120. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Sea level pressure was measured at station 74794. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Precipitation was measured at station 12886.

Table 120. STS-58 pad exposure period hourly extremes.

Minimum temperature	17.8 °C (64 °F)
Maximum temperature	33.3 °C (92 °F)
Minimum relative humidity	32%
Maximum relative humidity	93%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,021.3 hPa (30.16 inHg)
Maximum wind speed and associated wind direction	20.1 m/s (39 kt) 33°
Total precipitation	114.6 mm (4.51 in)

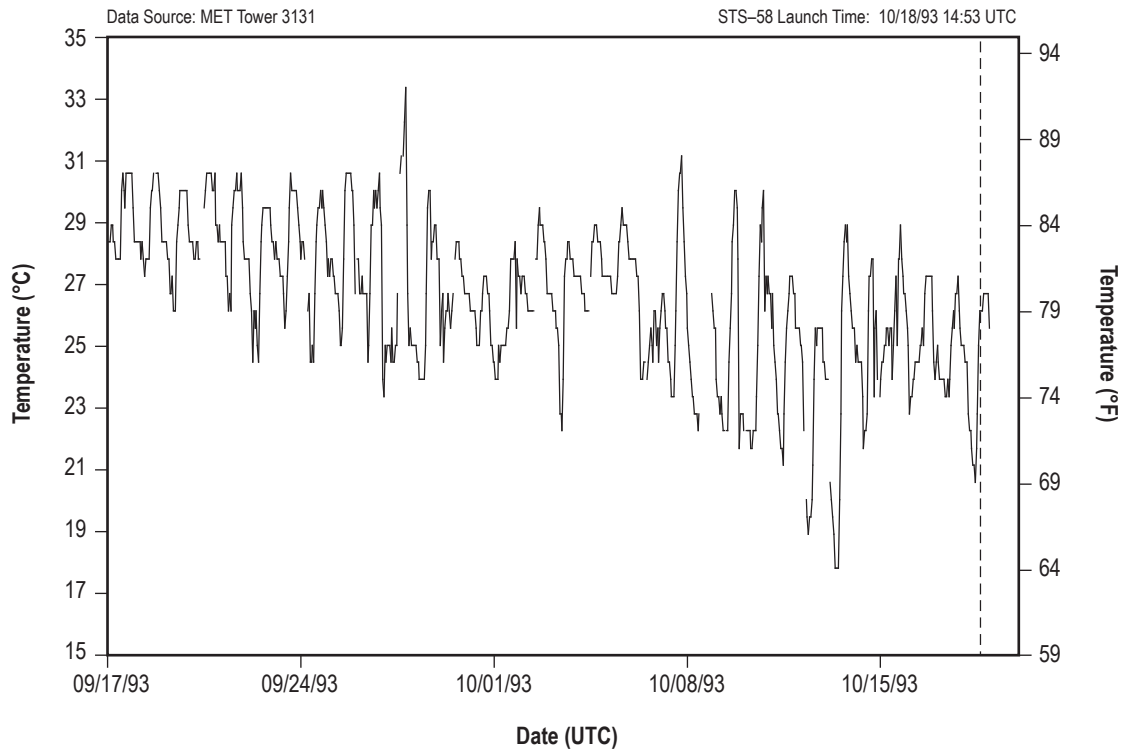


Figure 349. STS-58 hourly surface temperature.

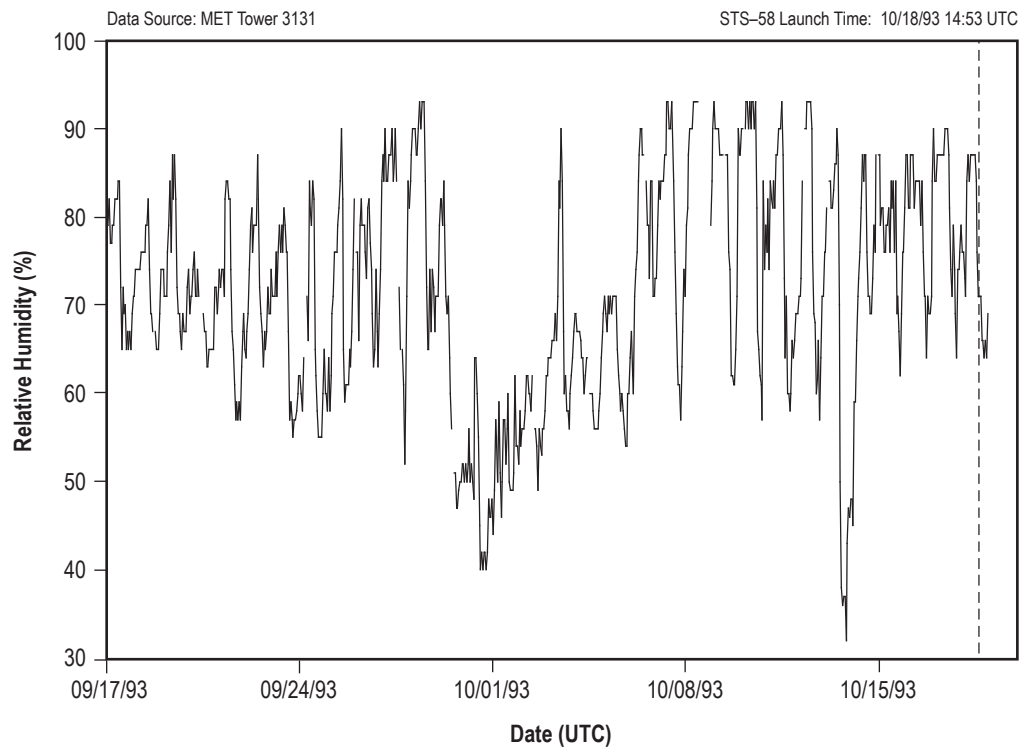


Figure 350. STS-58 hourly surface relative humidity.

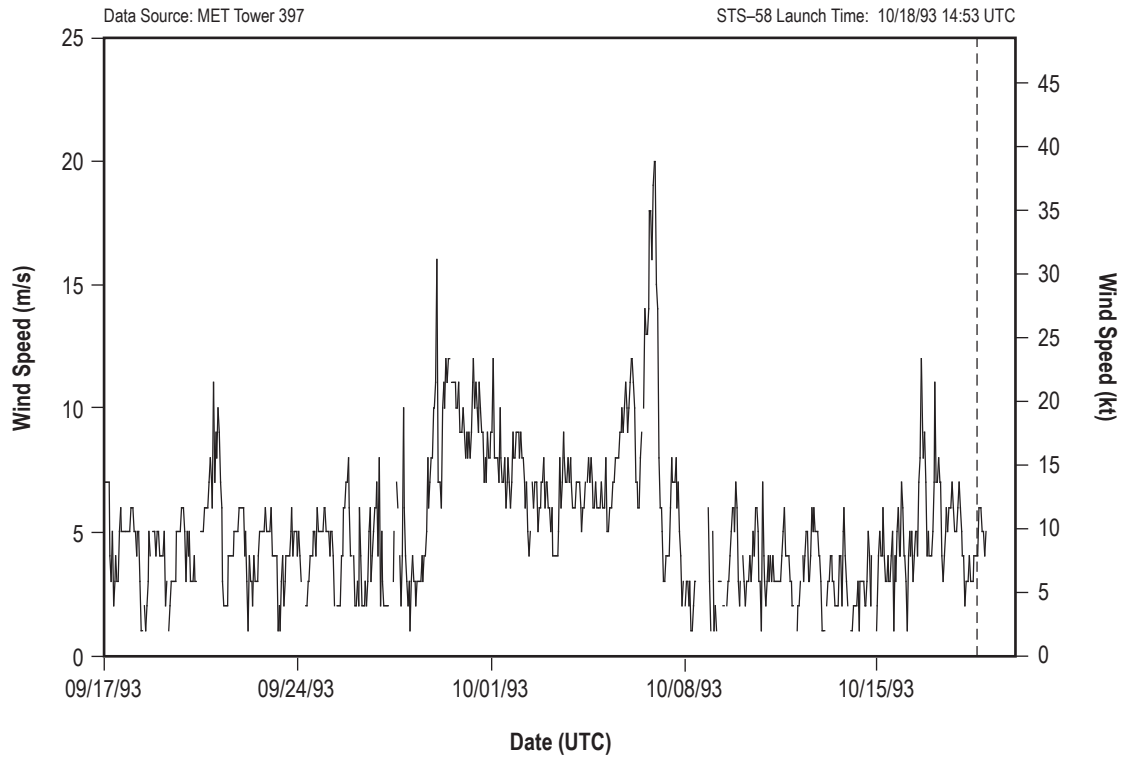


Figure 351. STS-58 hourly surface wind speed.

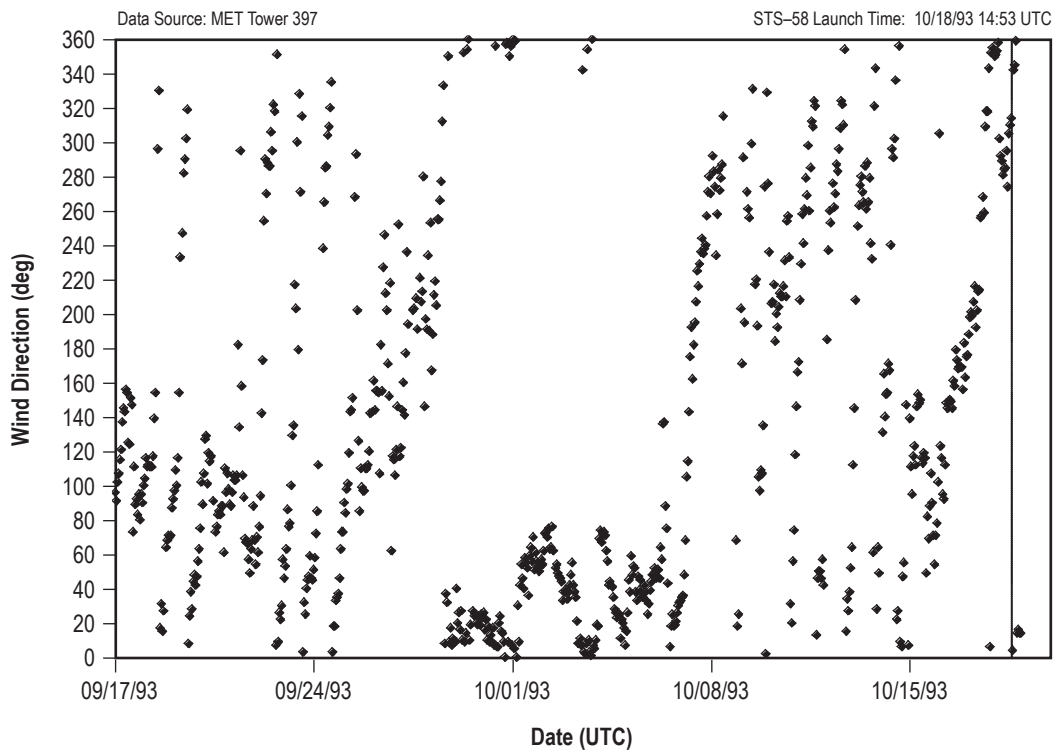


Figure 352. STS-58 hourly surface wind direction.



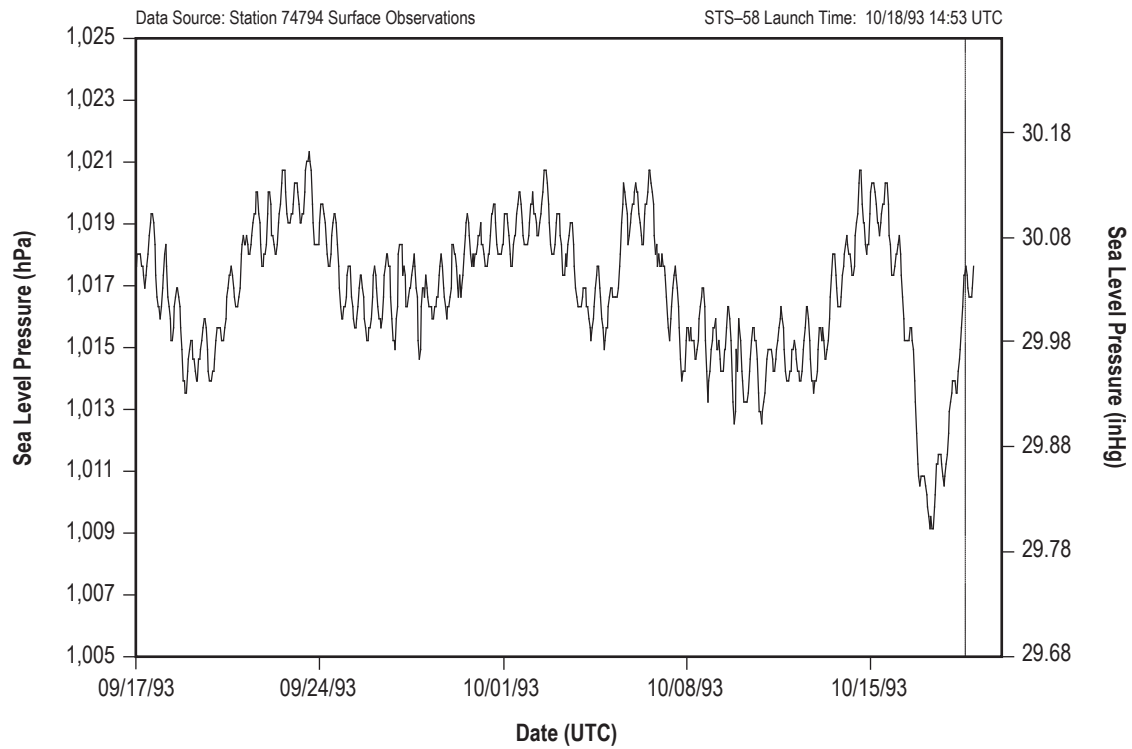


Figure 353. STS-58 hourly sea level pressure.

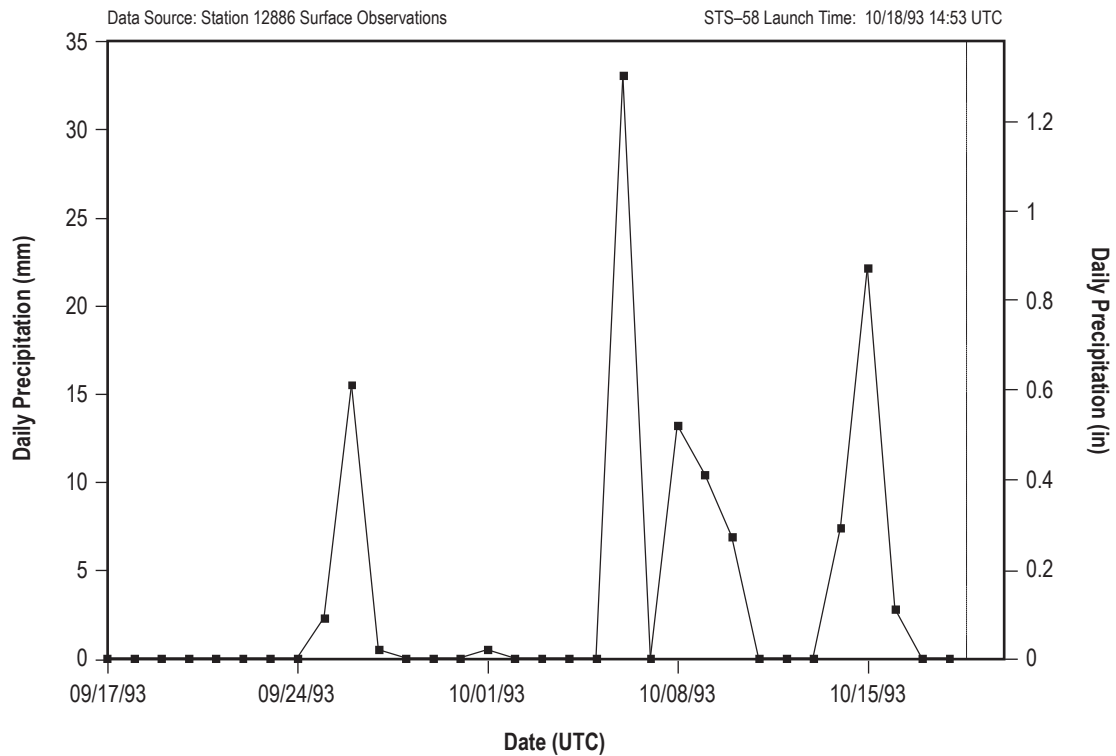


Figure 354. STS-58 daily precipitation totals.

## 5.59 STS–61

STS–61 was the fifth mission for *Endeavour* (OV–105). It rolled out to pad 39B on October 28, 1993. STS–61 was exposed on the pad for 35 days and launched on December 2, 1993, at 09:26 UTC.

### 5.59.1 STS–61 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–61 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.59.2 STS–61 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–61 are shown in table 121. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at Cape Canaveral Air Force station (XMR). Pressure has been adjusted to sea level in table 121.

Table 121. STS–61 L–0 surface observations.

Temperature	18.9 °C (66 °F)
Relative humidity	84%
Sea level pressure	1,024.4 hPa (30.25 inHg)
Wind speed	1.8 m/s (3.4 kt) (1-min average)
Wind direction	70° (1-min average)
Sky condition	1/8 stratocumulus at 1,372 m (4,500 ft)
Visibility	16.1 km (8.7 nmi)

### 5.59.3 STS–61 Pad Exposure Period Hourly Meteorological Parameters

Figures 355–360 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–61 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 122. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 122. STS–61 pad exposure period hourly extremes.

Minimum temperature	2.8 °C (37 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	42%
Maximum relative humidity	93%
Minimum sea level pressure	1,005.4 hPa (29.69 inHg)
Maximum sea level pressure	1,027.8 hPa (30.35 inHg)
Maximum wind speed and associated wind direction	16 m/s (31 kt) 200°
Total precipitation	15.5 mm (0.61 in)

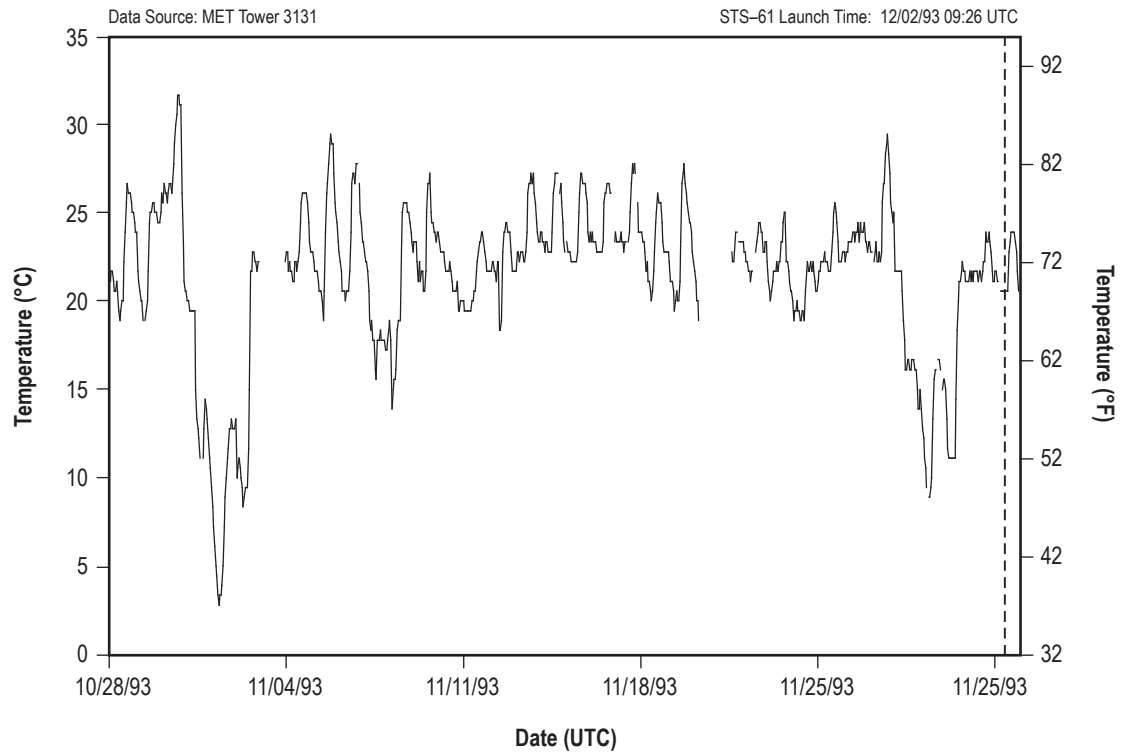


Figure 355. STS-61 hourly surface temperature.

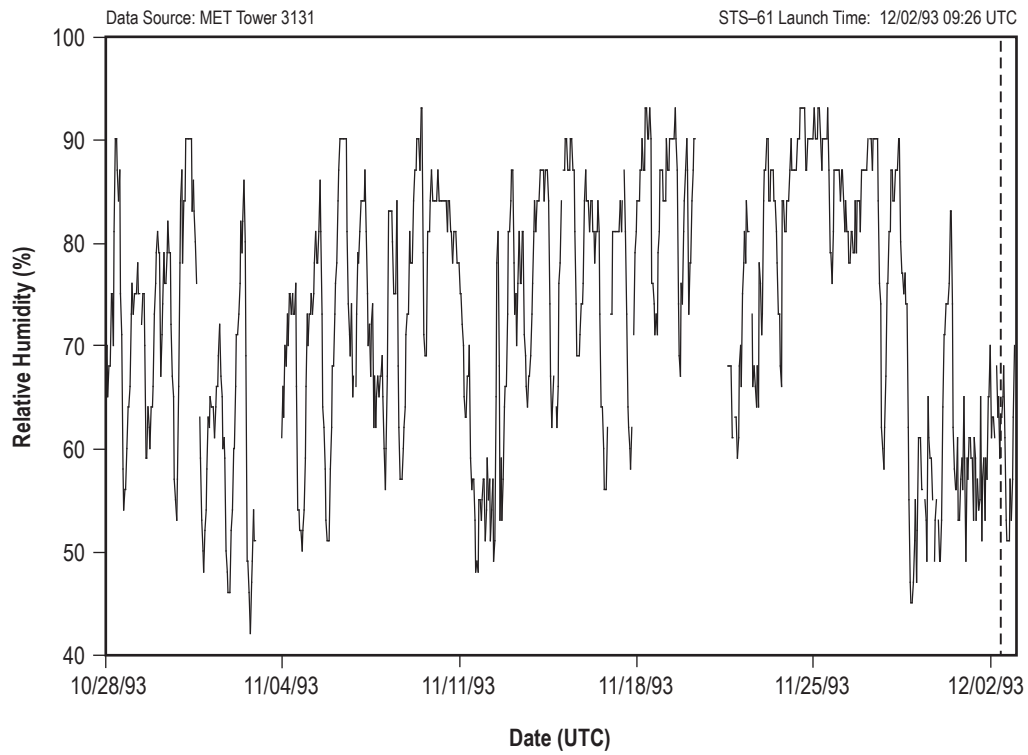


Figure 356. STS-61 hourly surface relative humidity.

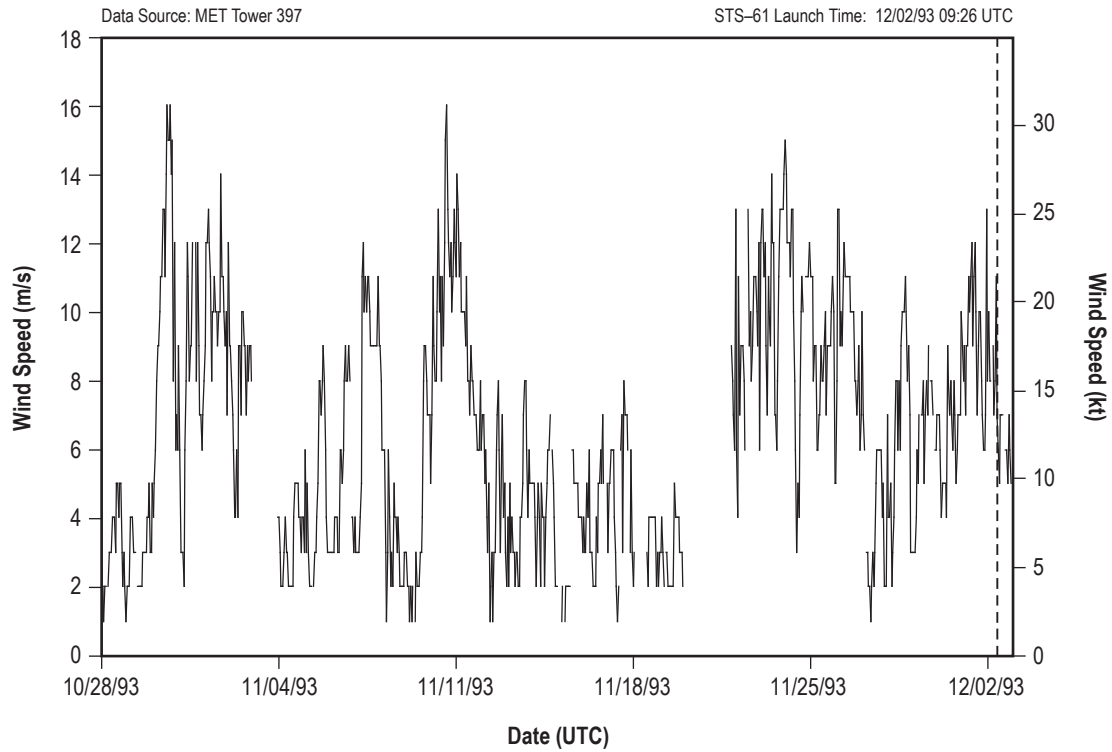


Figure 357. STS-61 hourly surface wind speed.

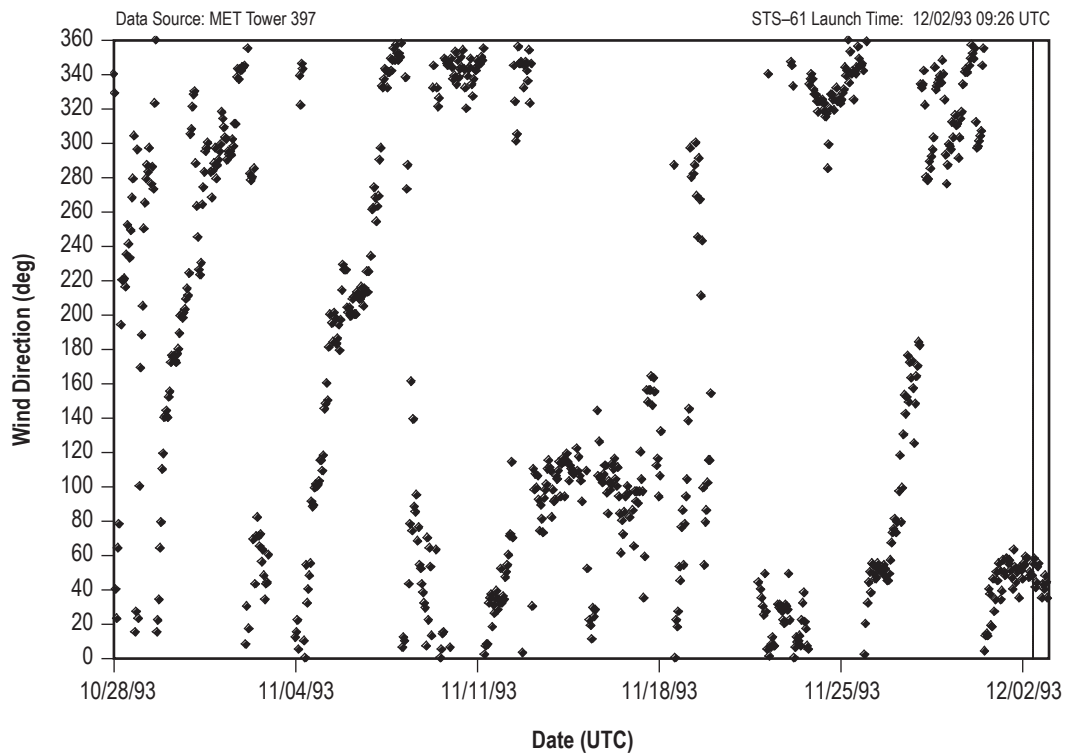


Figure 358. STS-61 hourly surface wind direction.

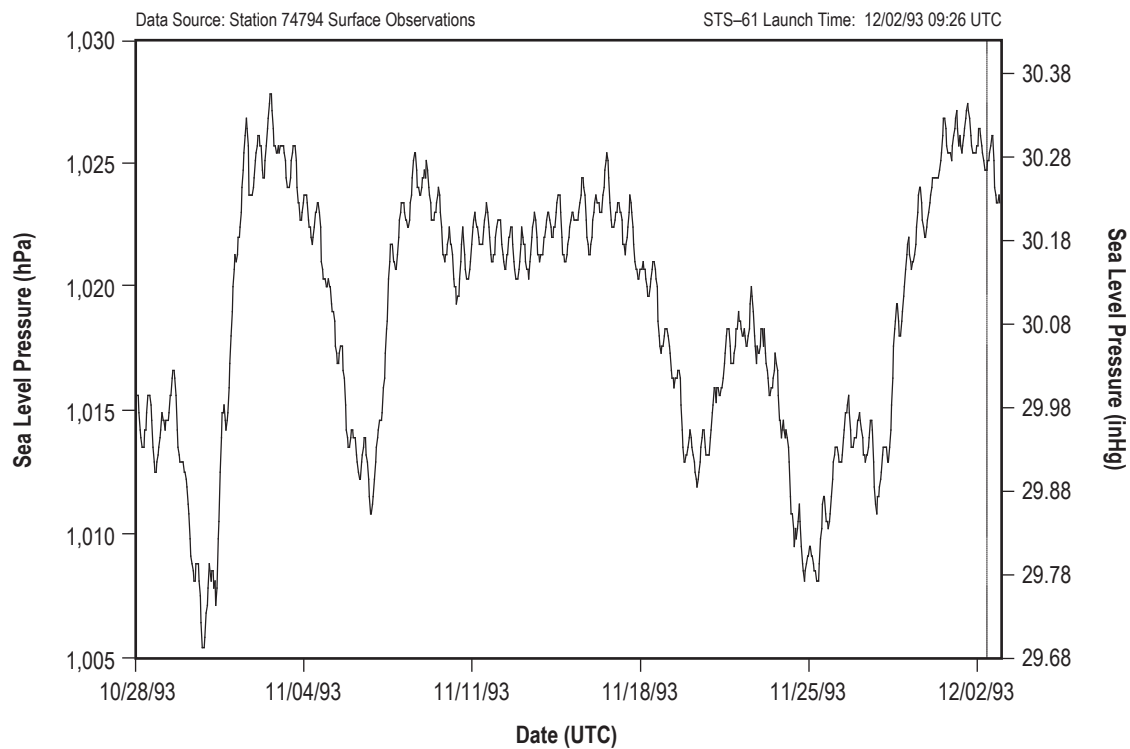


Figure 359. STS-61 hourly sea level pressure.

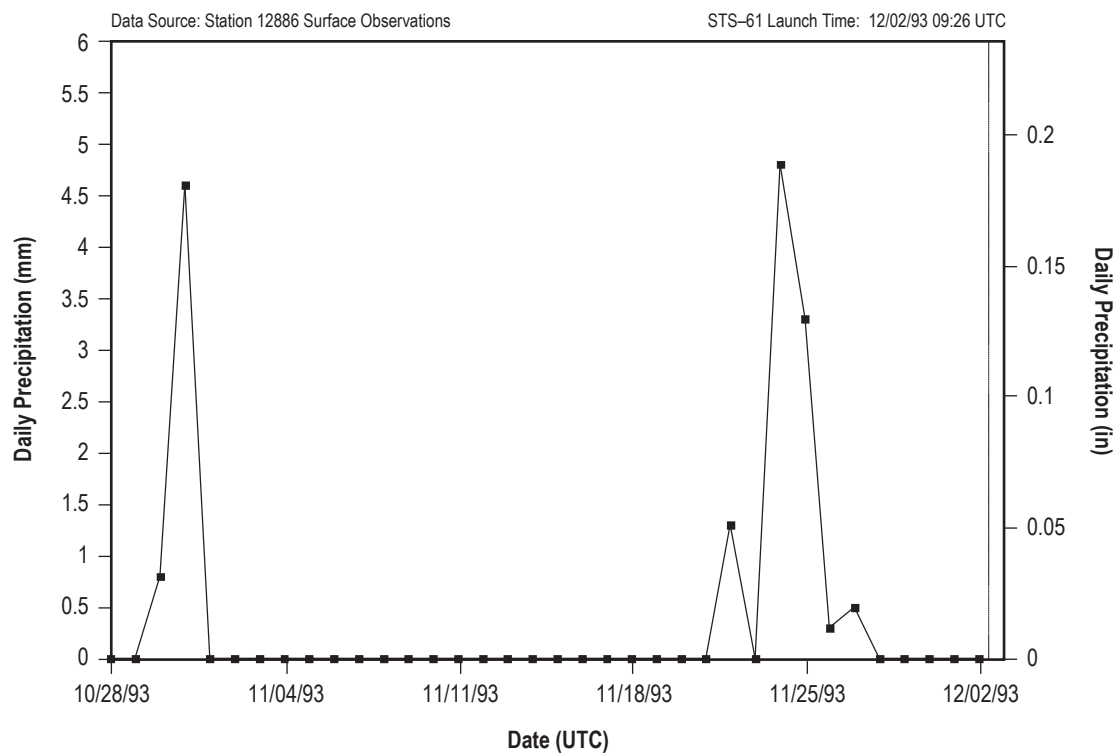


Figure 360. STS-61 daily precipitation totals.

## 5.60 STS–60

STS–60 was the 18th mission for *Discovery* (OV–103). It rolled out to pad 39A on January 10, 1994. STS–60 was exposed on the pad for 25 days and launched on February 3, 1994, at 12:10 UTC.

### 5.60.1 STS–60 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–60 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.60.2 STS–60 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–60 are shown in table 123. Temperature and relative humidity measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at Cape Canaveral Air Force station (XMR). Pressure has been adjusted to sea level in table 123.

Table 123. STS–60 L–0 surface observations.

Temperature	7.2 °C (45 °F)
Relative humidity	82%
Sea level pressure	1,027.8 hPa (30.35 inHg)
Wind speed	4.2 m/s (8.2 kt) (1-min average)
Wind direction	318° (1-min average)
Sky condition	4/8 stratocumulus at 792 m (2,600 ft); 7/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.60.3 STS–60 Pad Exposure Period Hourly Meteorological Parameters

Figures 361–366 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–60 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 124. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 393 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 124. STS–60 pad exposure period hourly extremes.

Minimum temperature	3.9 °C (39 °F)
Maximum temperature	27.2 °C (81 °F)
Minimum relative humidity	38%
Maximum relative humidity	96%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,032.5 hPa (30.49 inHg)
Maximum wind speed and associated wind direction	16 m/s (31 kt) 187°
Total precipitation	86.1 mm (3.39 in)

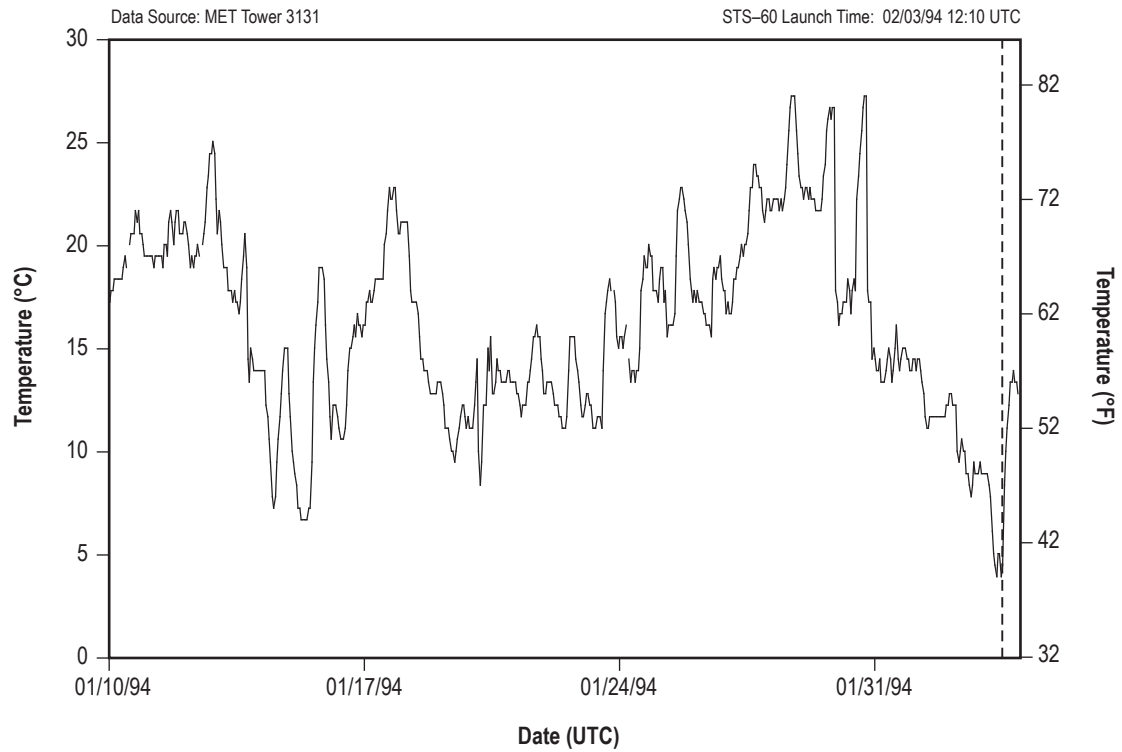


Figure 361. STS-60 hourly surface temperature.

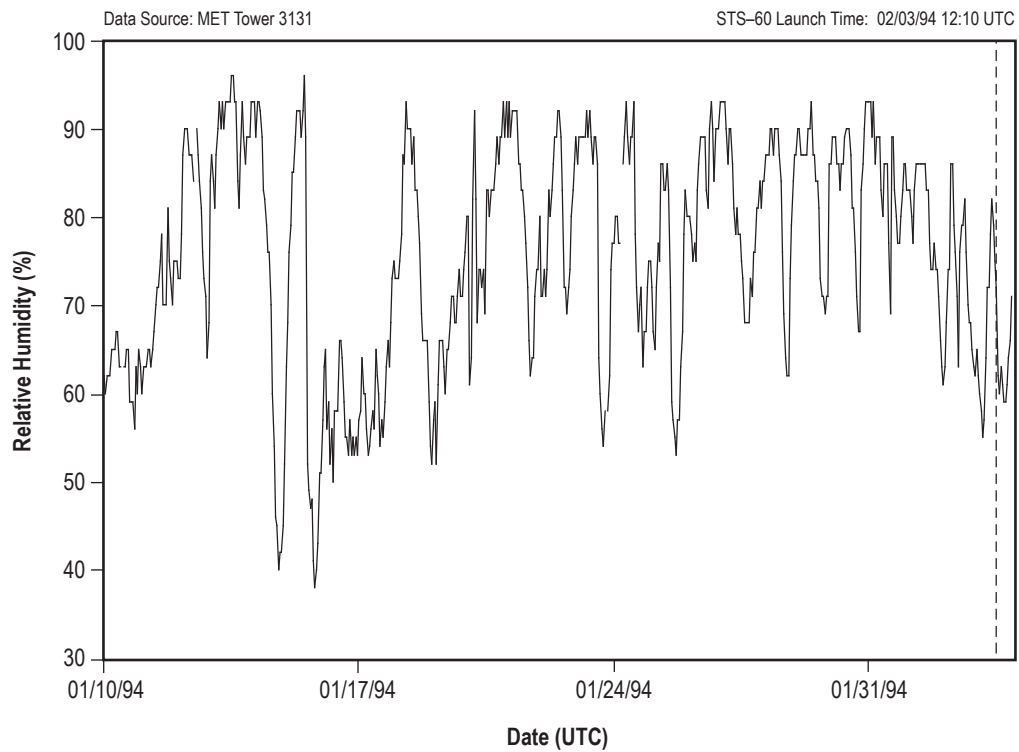


Figure 362. STS-60 hourly surface relative humidity.

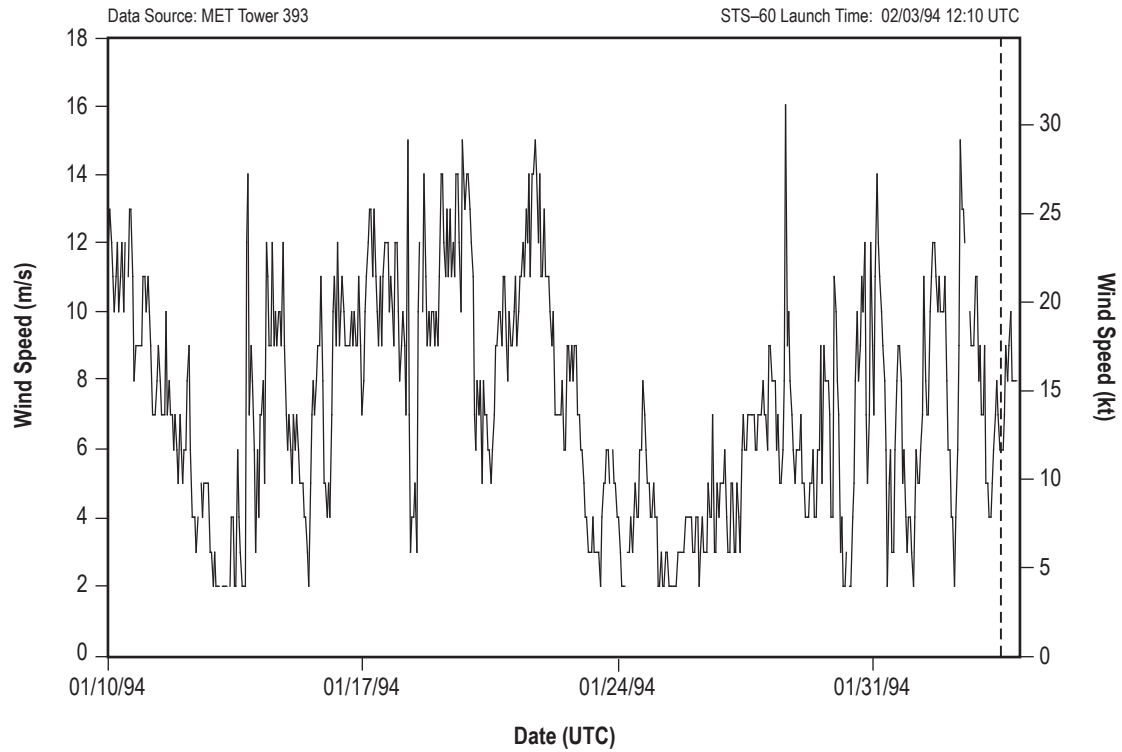


Figure 363. STS-60 hourly surface wind speed.

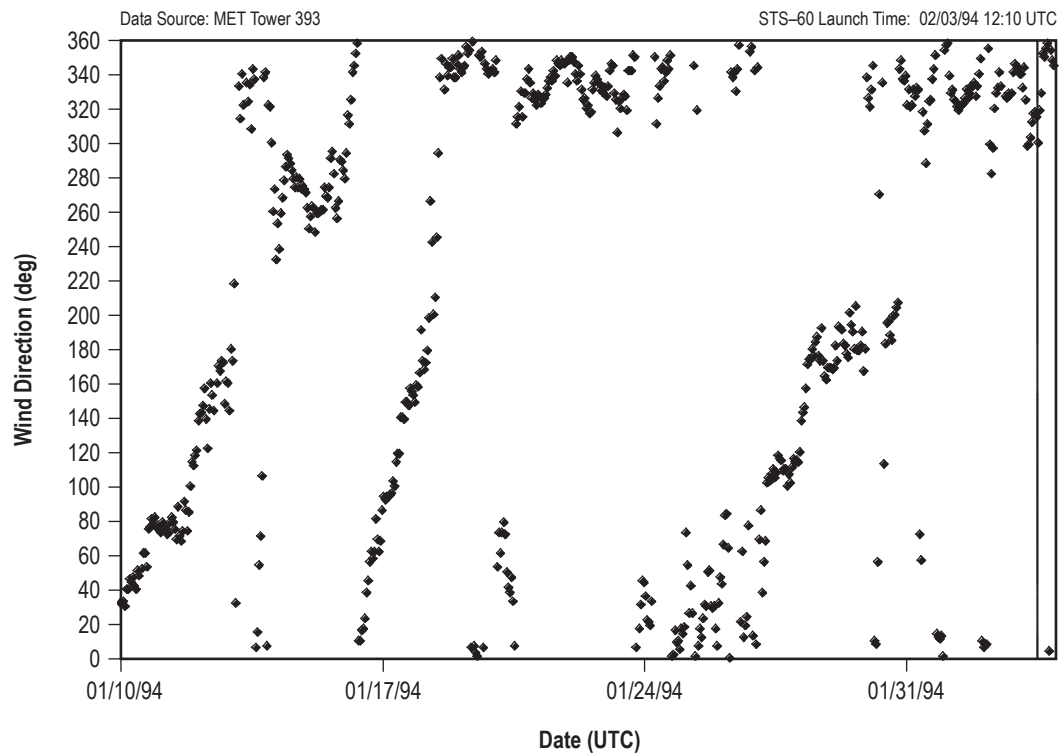


Figure 364. STS-60 hourly surface wind direction.



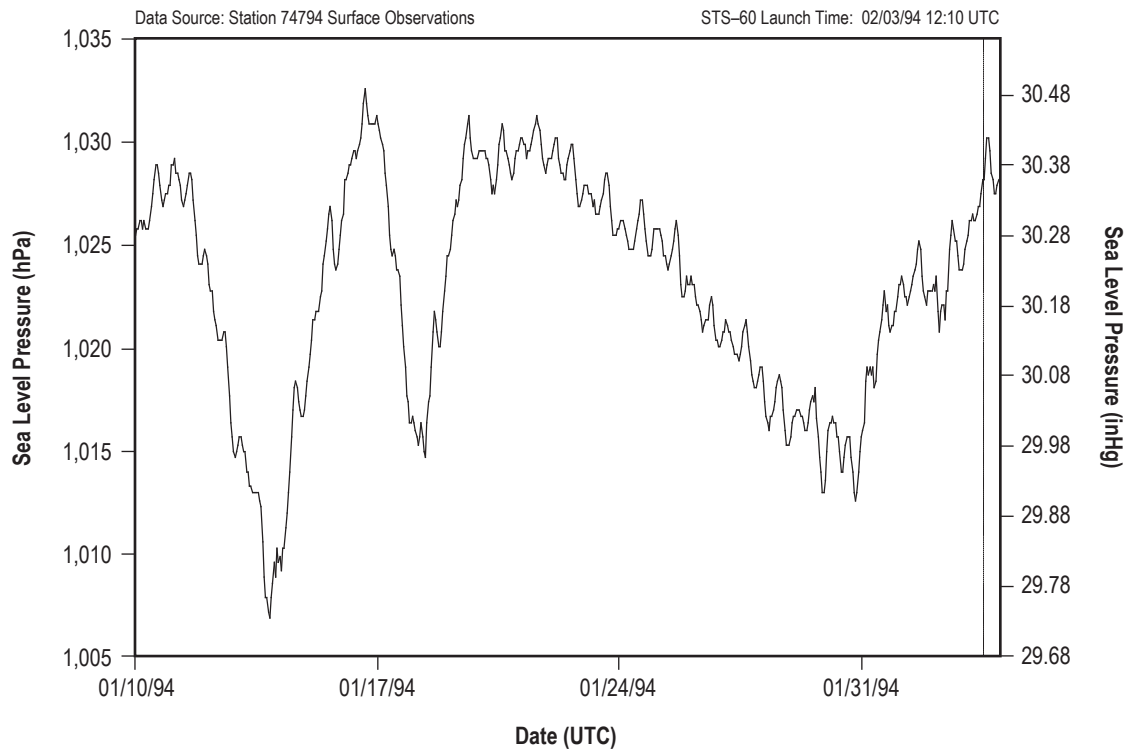


Figure 365. STS-60 hourly sea level pressure.

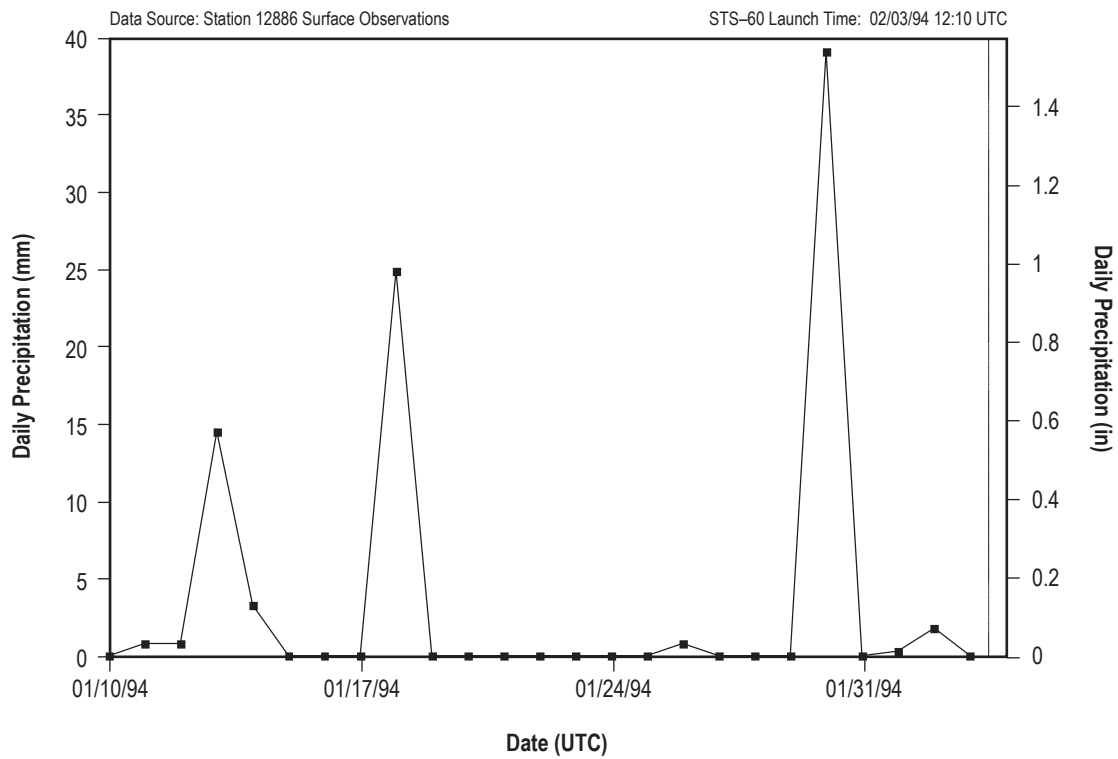


Figure 366. STS-60 daily precipitation totals.

## 5.61 STS-62

STS-62 was the 16th mission for *Columbia* (OV-102). It rolled out to pad 39B on February 10, 1994. STS-62 was exposed on the pad for 23 days and launched on March 4, 1994, at 13:53 UTC.

### 5.61.1 STS-62 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS-62 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.61.2 STS-62 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-62 are shown in table 125. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 125.

Table 125. STS-62 L-0 surface observations.

Temperature	11.7 °C (53 °F)
Relative humidity	57%
Sea level pressure	1,018.3 hPa (30.07 inHg)
Wind speed	5 m/s (9.7 kt) (1-min average)
Wind direction	285° (1-min average)
Sky condition	8/8 cirrostratus at 9,754 m (32,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.61.3 STS-62 Pad Exposure Period Hourly Meteorological Parameters

Figures 367–372 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-62 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 126. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 126. STS-62 pad exposure period hourly extremes.

Minimum temperature	6.1 °C (43 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	23%
Maximum relative humidity	100%
Minimum sea level pressure	1,002.7 hPa (29.61 inHg)
Maximum sea level pressure	1,027.1 hPa (30.33 inHg)
Maximum wind speed and associated wind direction	19 m/s (37 kt) 187°
Total precipitation	149.9 mm (5.9 in)

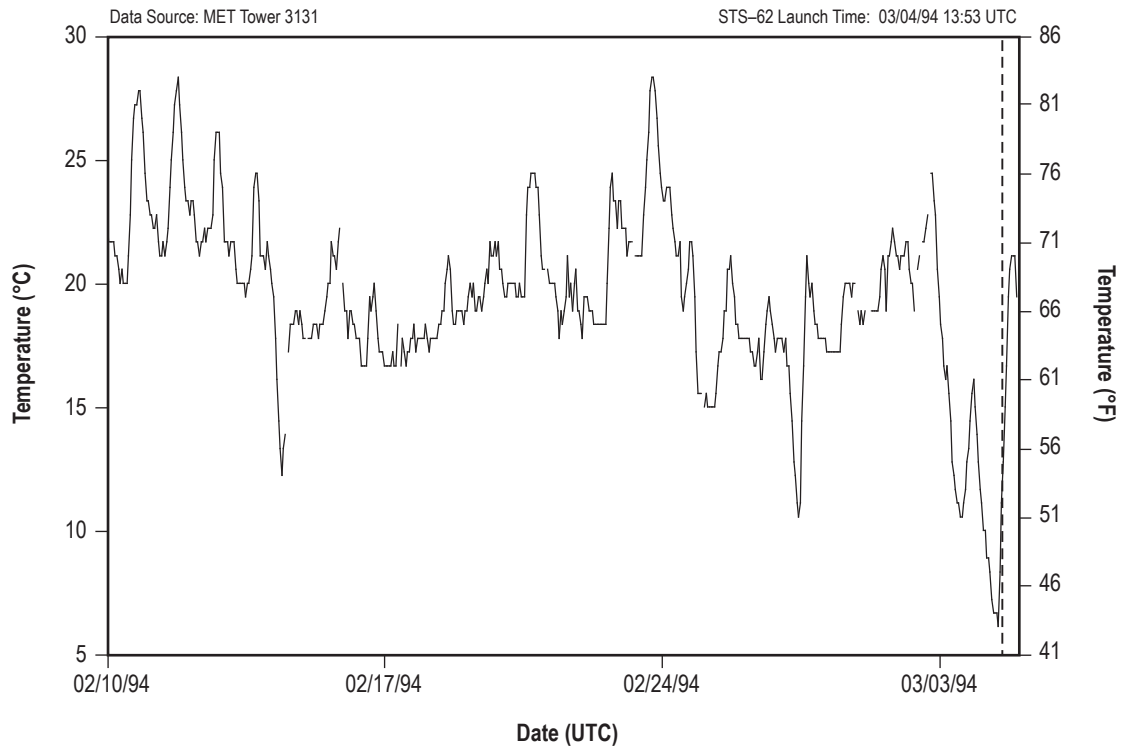


Figure 367. STS-62 hourly surface temperature.

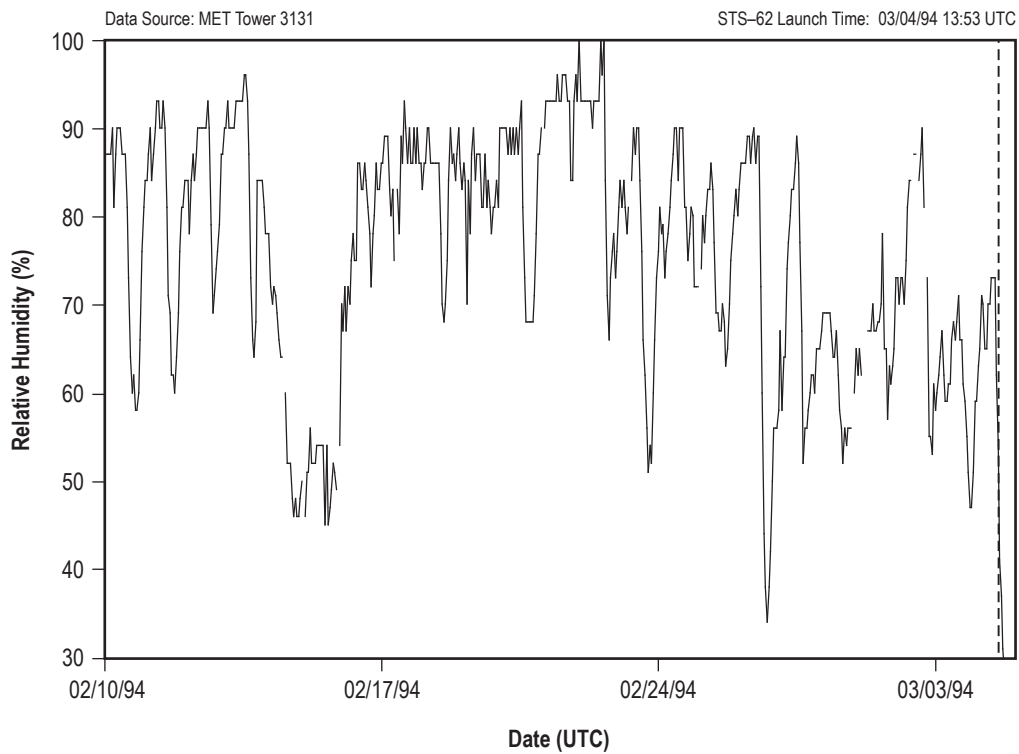


Figure 368. STS-62 hourly surface relative humidity.

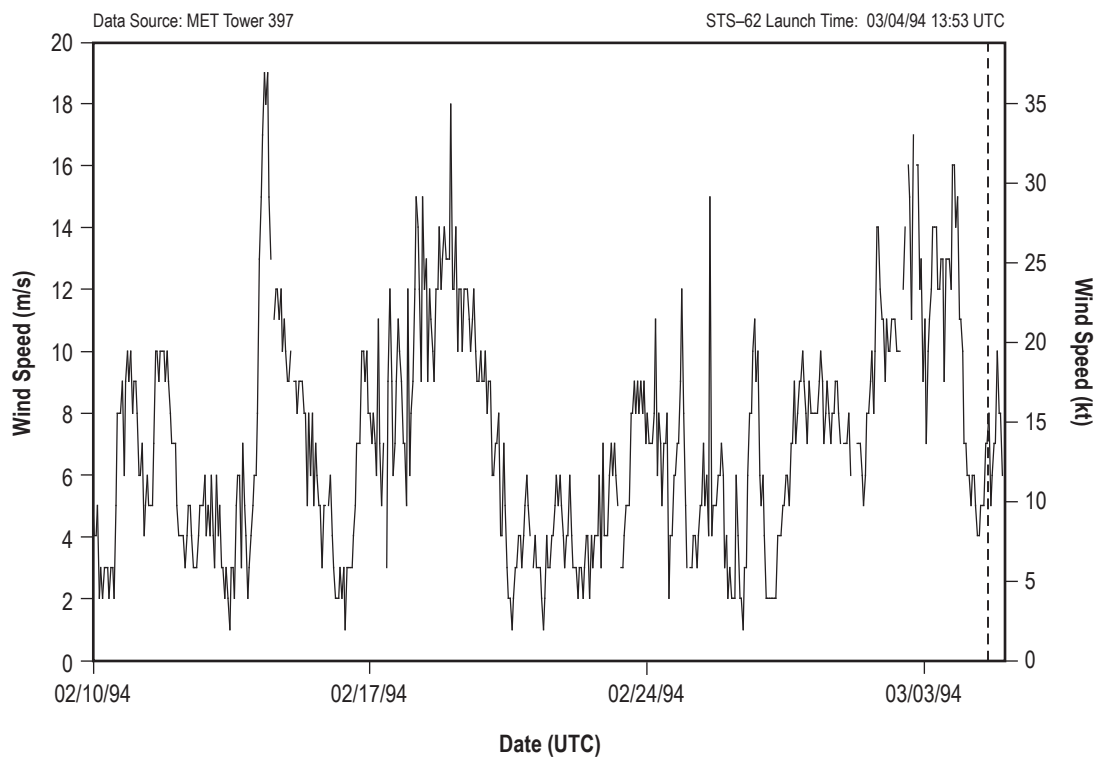


Figure 369. STS-62 hourly surface wind speed.

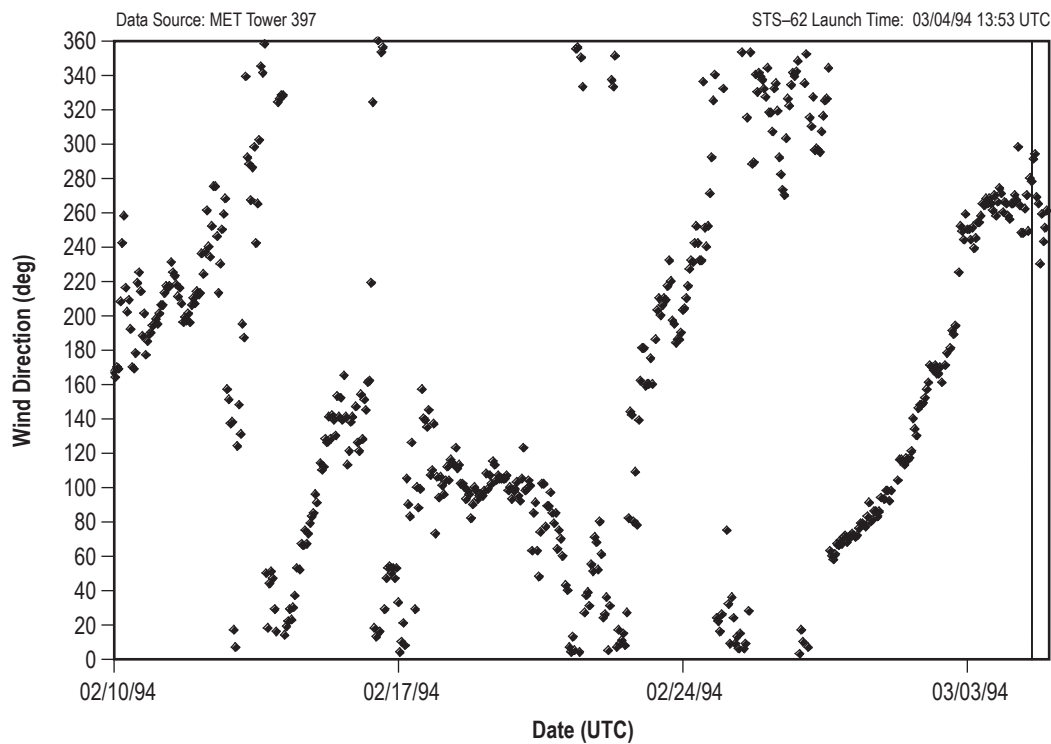


Figure 370. STS-62 hourly surface wind direction.

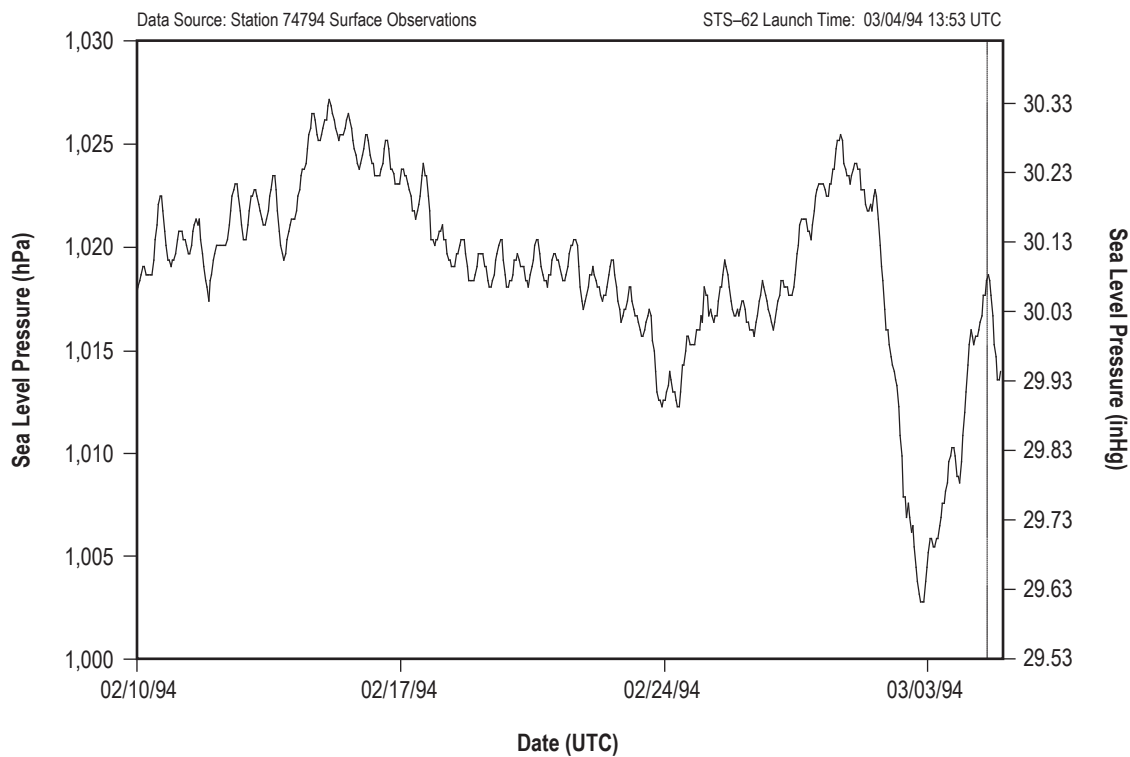


Figure 371. STS-62 hourly sea level pressure.

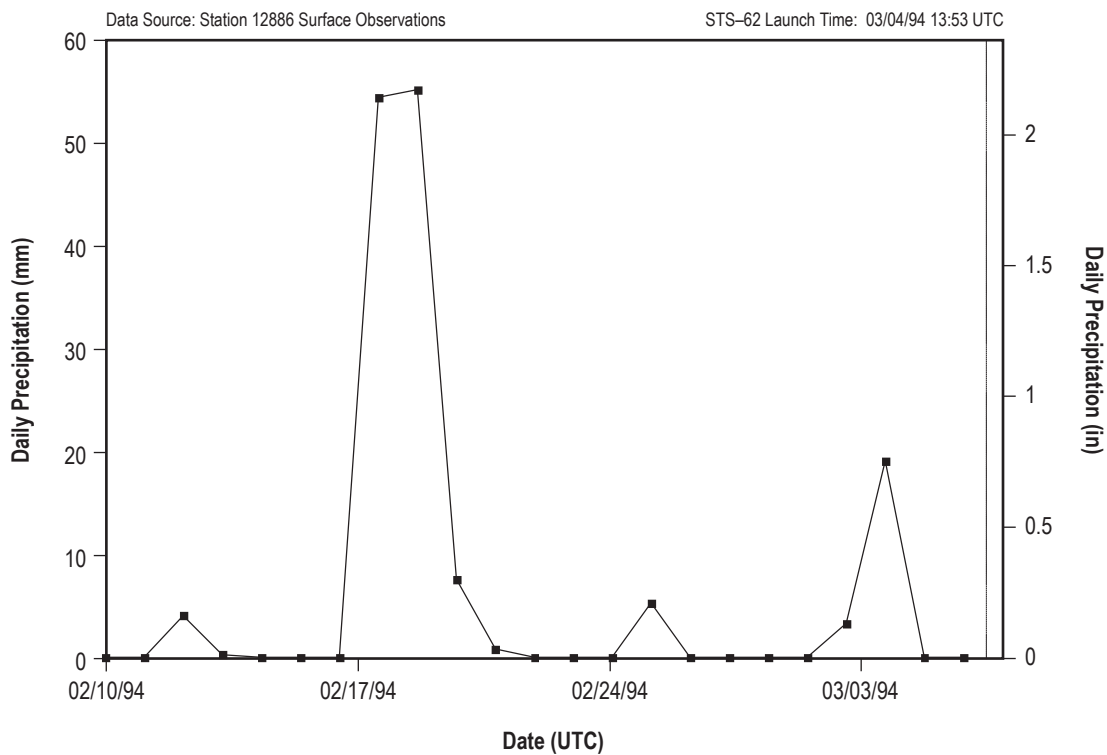


Figure 372. STS-62 daily precipitation totals.

## 5.62 STS-59

STS-59 was the sixth mission for *Endeavour* (OV-105). It rolled out to pad 39A on March 19, 1994. STS-59 was exposed on the pad for 21 days and launched on April 9, 1994, at 11:05 UTC.

### 5.62.1 STS-59 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393 and 394 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS-59 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.62.2 STS-59 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-59 are shown in table 127. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 127. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 127. STS-59 L-0 surface observations.

Temperature	22 °C (71.6 °F)
Relative humidity	81%
Sea level pressure	1,024 hPa (30.24 inHg)
Wind speed	9.8 m/s (19 kt) (1-min average)
Wind direction	100° (1-min average)
Sky condition	1/8 stratocumulus at 853 m (2,800 ft); 1/8 stratocumulus at 1,981 m (6,500 ft)
Visibility	12.8 km (6.9 nmi)

### 5.62.3 STS-59 Pad Exposure Period Hourly Meteorological Parameters

Figures 373–378 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-59 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 128. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 393 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 128. STS-59 pad exposure period hourly extremes.

Minimum temperature	13.9 °C (57 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	34%
Maximum relative humidity	93%
Minimum sea level pressure	1,010.5 hPa (29.84 inHg)
Maximum sea level pressure	1,026.1 hPa (30.3 inHg)
Maximum wind speed and associated wind direction	17 m/s (33 kt) 17°
Total precipitation	20.1 mm (0.79 in)

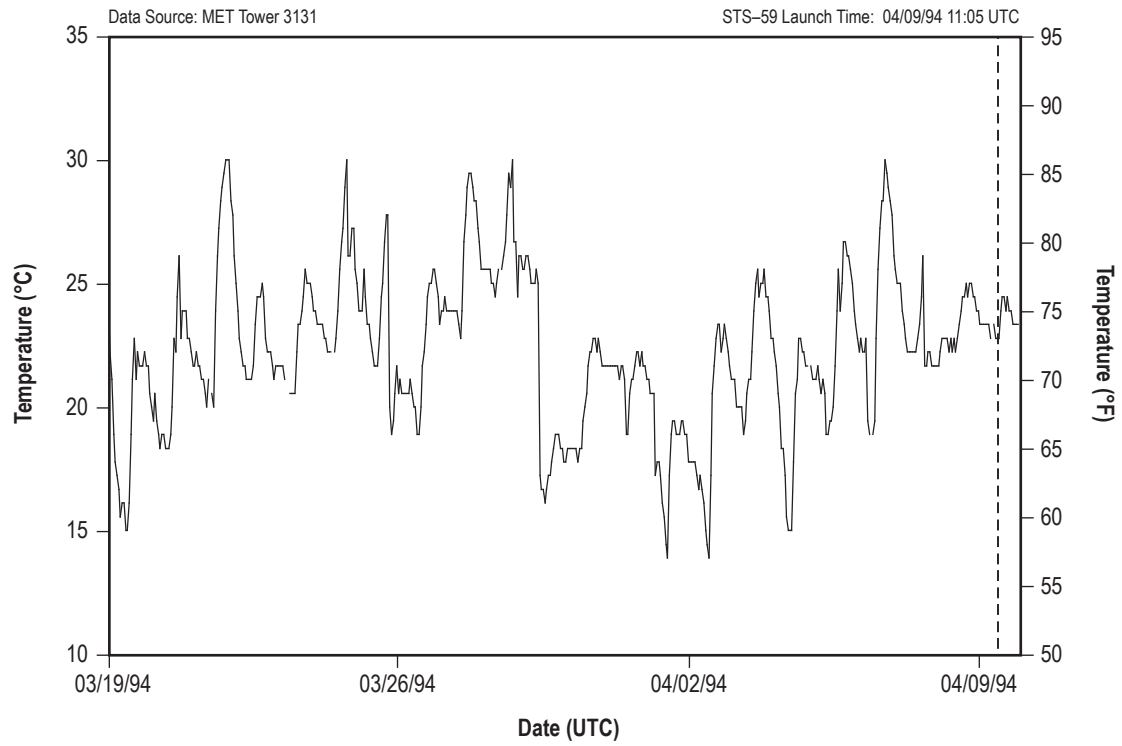


Figure 373. STS-59 hourly surface temperature.

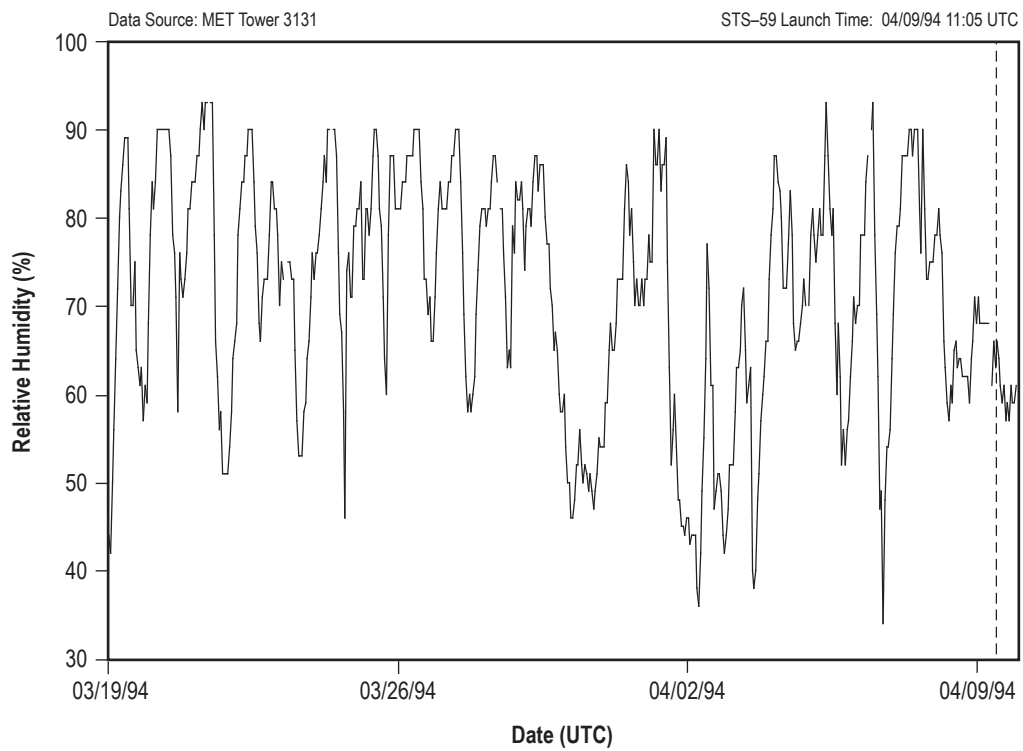


Figure 374. STS-59 hourly surface relative humidity.

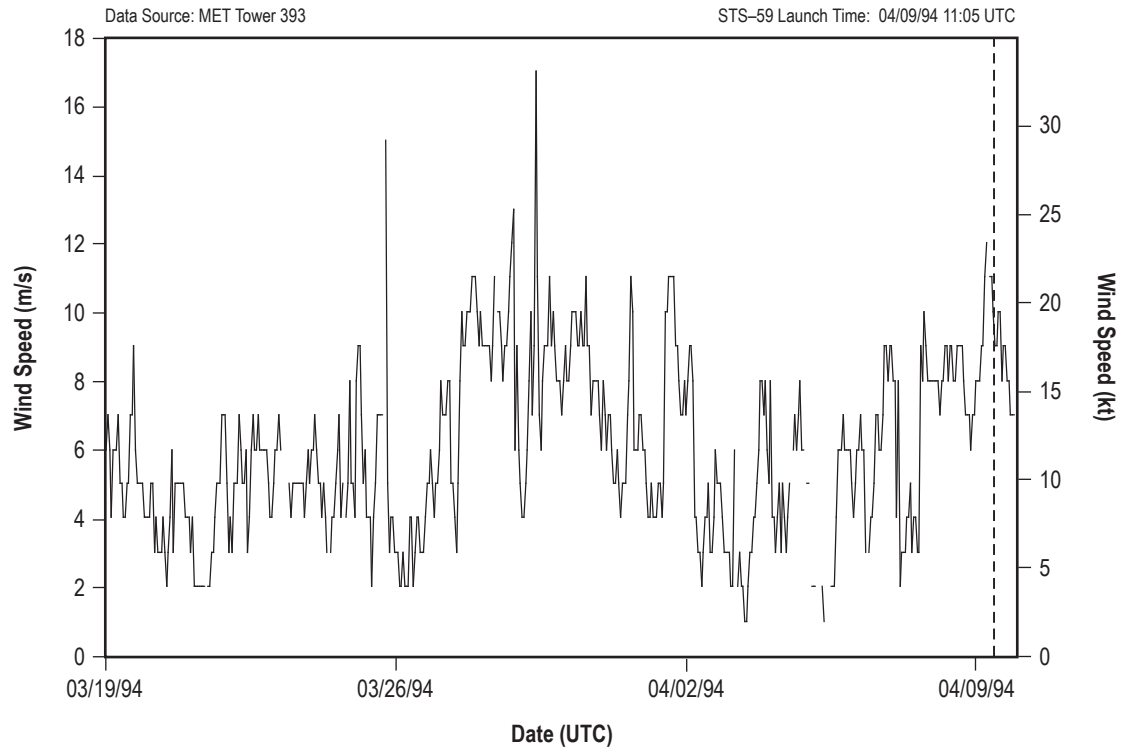


Figure 375. STS-59 hourly surface wind speed.

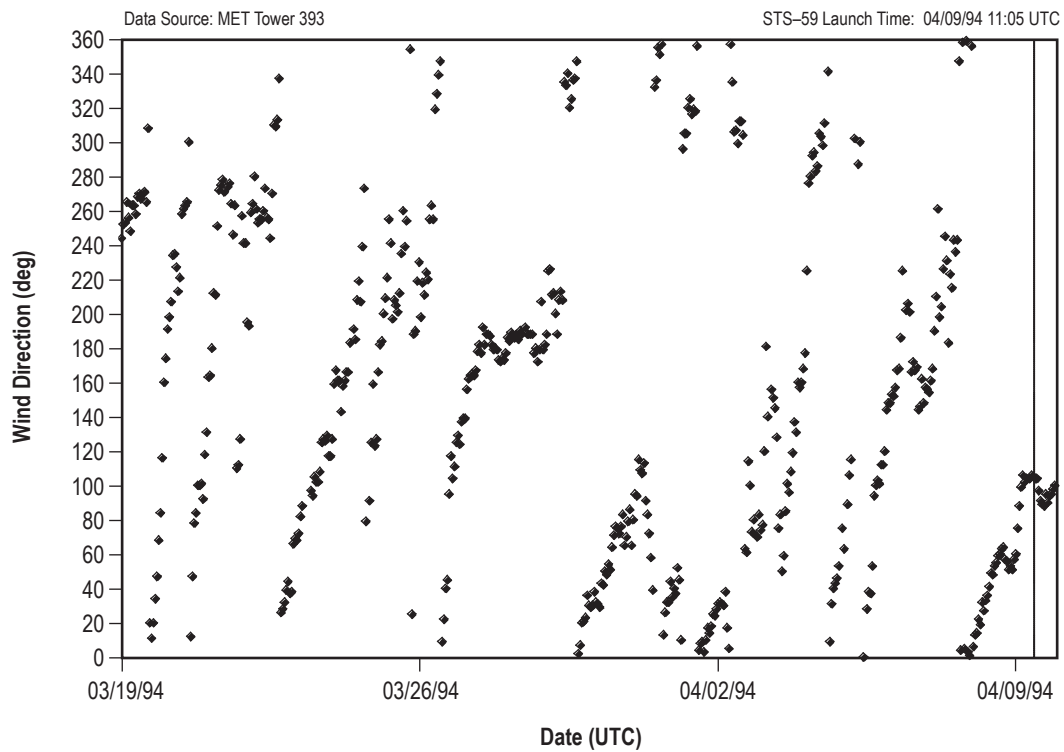


Figure 376. STS-59 hourly surface wind direction.



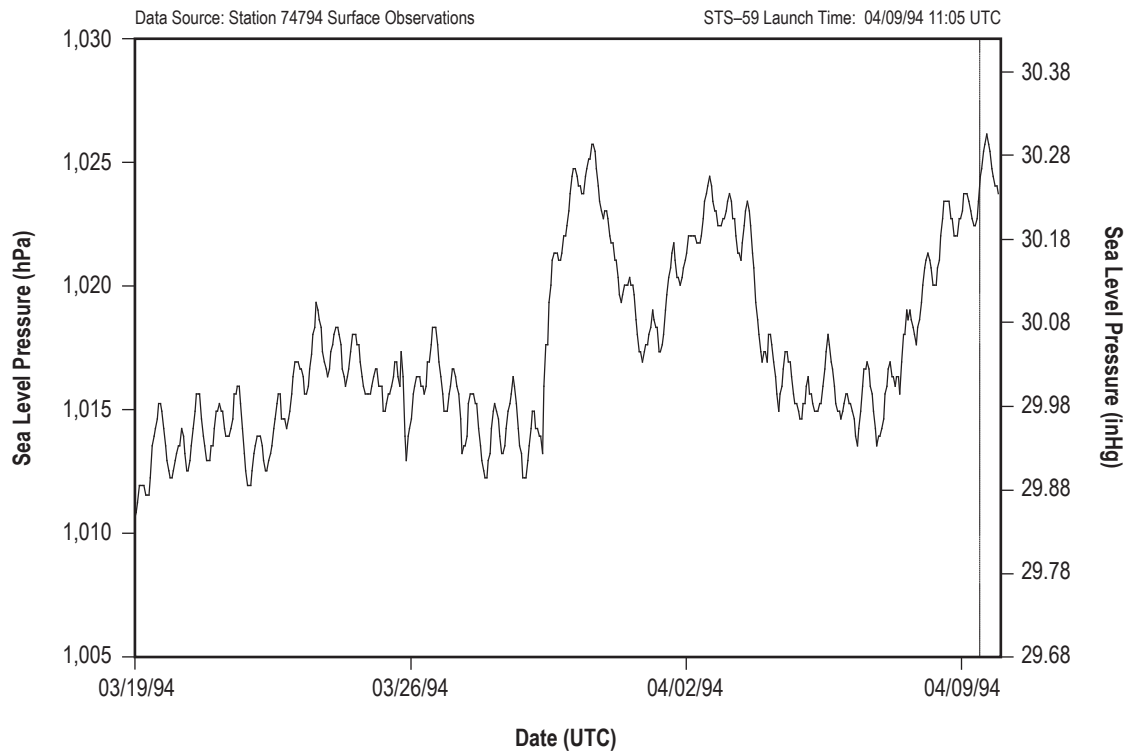


Figure 377. STS-59 hourly sea level pressure.

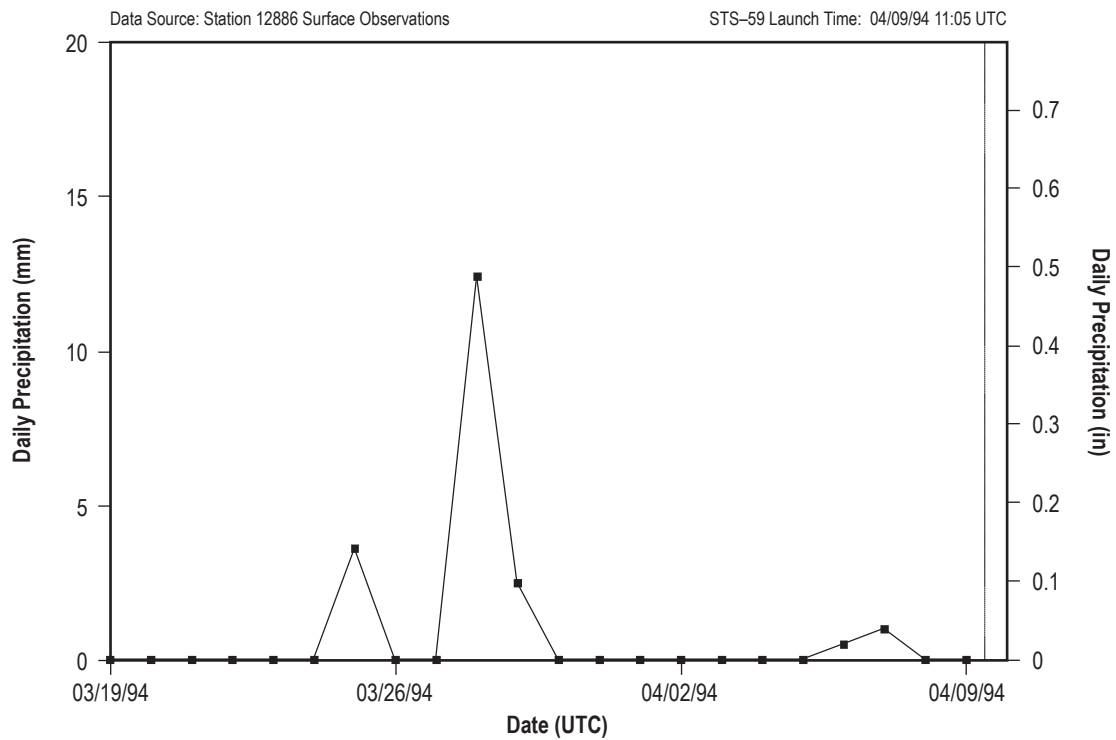


Figure 378. STS-59 daily precipitation totals.

## 5.63 STS–65

STS–65 was the 17th mission for *Columbia* (OV–102). It rolled out to pad 39A on June 15, 1994. STS–65 was exposed on the pad for 24 days and launched on July 8, 1994, at 16:43 UTC.

### 5.63.1 STS–65 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–65 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.63.2 STS–65 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–65 are shown in table 129. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 129. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 129. STS–65 L–0 surface observations.

Temperature	30.1 °C (86.2 °F)
Relative humidity	72%
Sea level pressure	1,023.4 hPa (30.22 inHg)
Wind speed	4.7 m/s (9.2 kt) (1-min average)
Wind direction	100° (1-min average)
Sky condition	3/8 stratocumulus at 823 m (2,700 ft); 3/8 cirrus at 6,096 m (20,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.63.3 STS–65 Pad Exposure Period Hourly Meteorological Parameters

Figures 379–384 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–65 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 130. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 393 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 130. STS–65 pad exposure period hourly extremes.

Minimum temperature	23.3 °C (74 °F)
Maximum temperature	36.1 °C (97 °F)
Minimum relative humidity	46%
Maximum relative humidity	93%
Minimum sea level pressure	1,013.9 hPa (29.94 inHg)
Maximum sea level pressure	1,023.4 hPa (30.22 inHg)
Maximum wind speed and associated wind direction	22.1 m/s (43 kt) 46°
Total precipitation	276.6 mm (10.89 in)

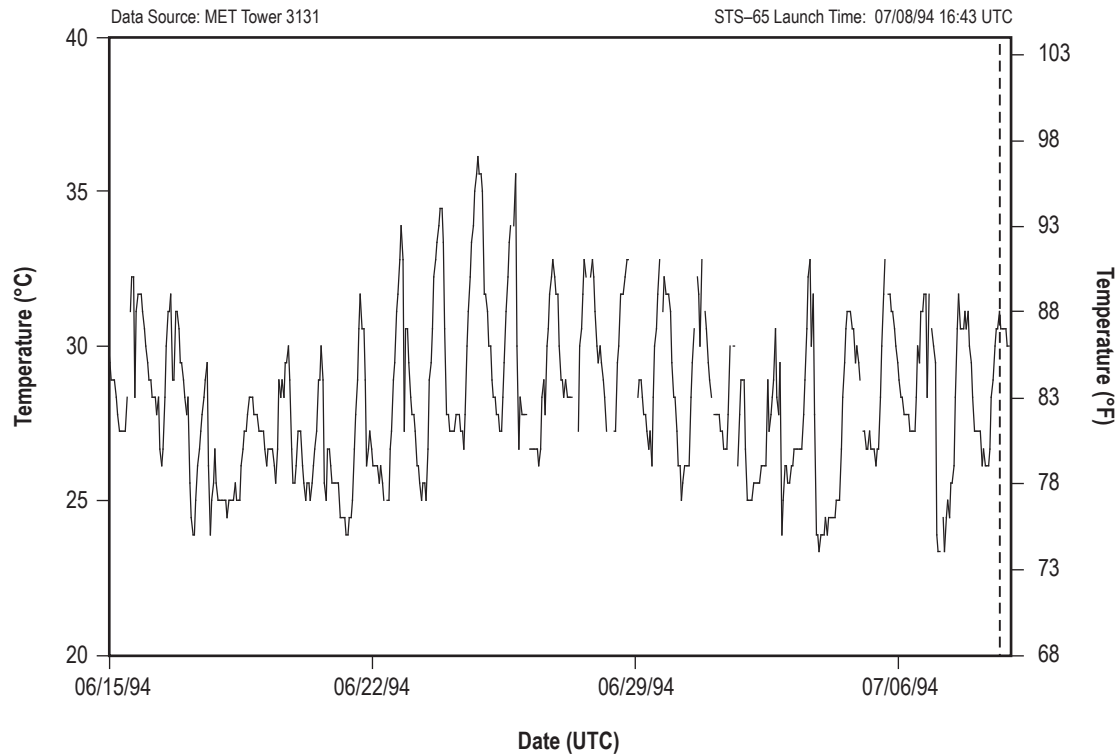


Figure 379. STS-65 hourly surface temperature.

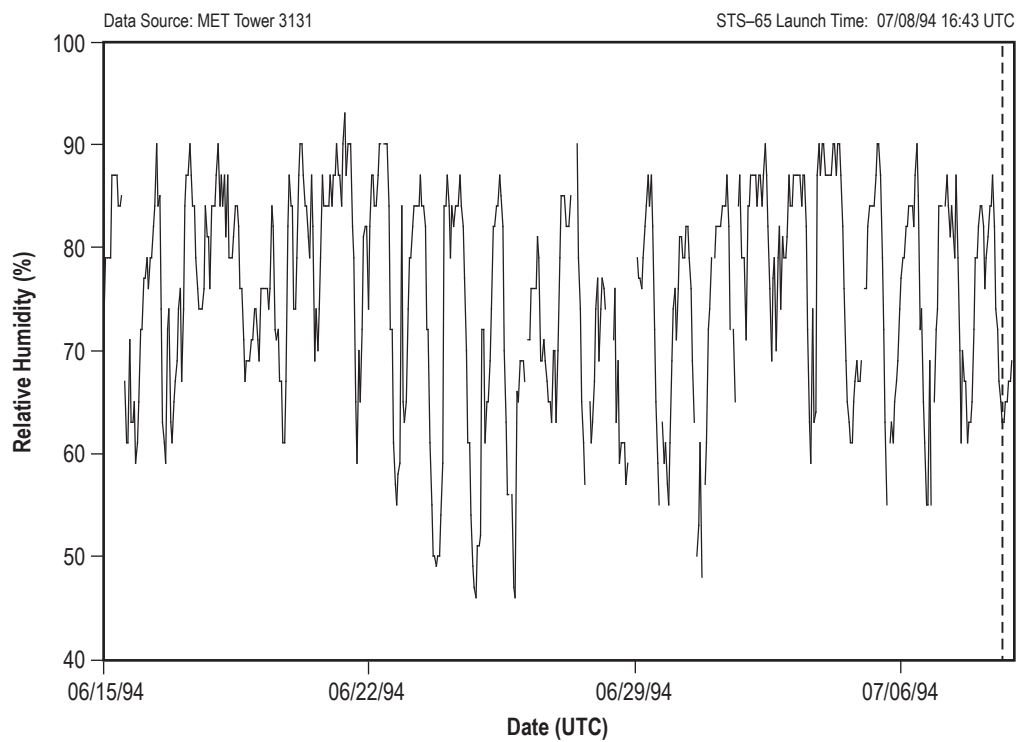


Figure 380. STS-65 hourly surface relative humidity.

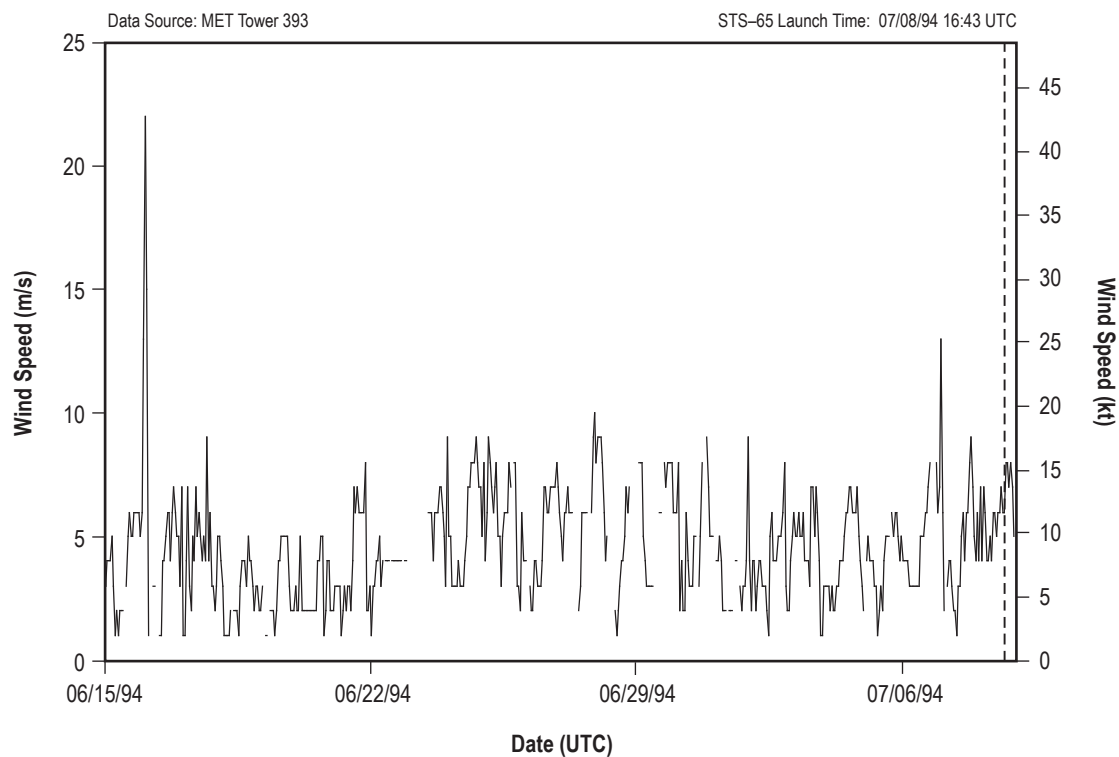


Figure 381. STS-65 hourly surface wind speed.

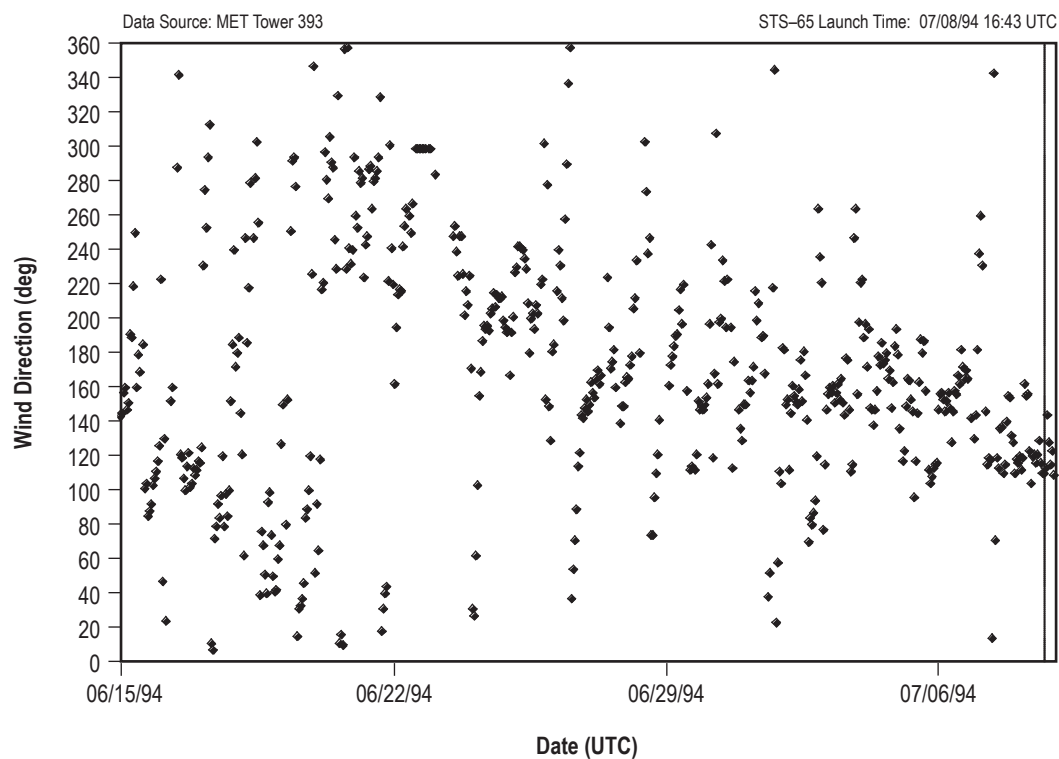


Figure 382. STS-65 hourly surface wind direction.

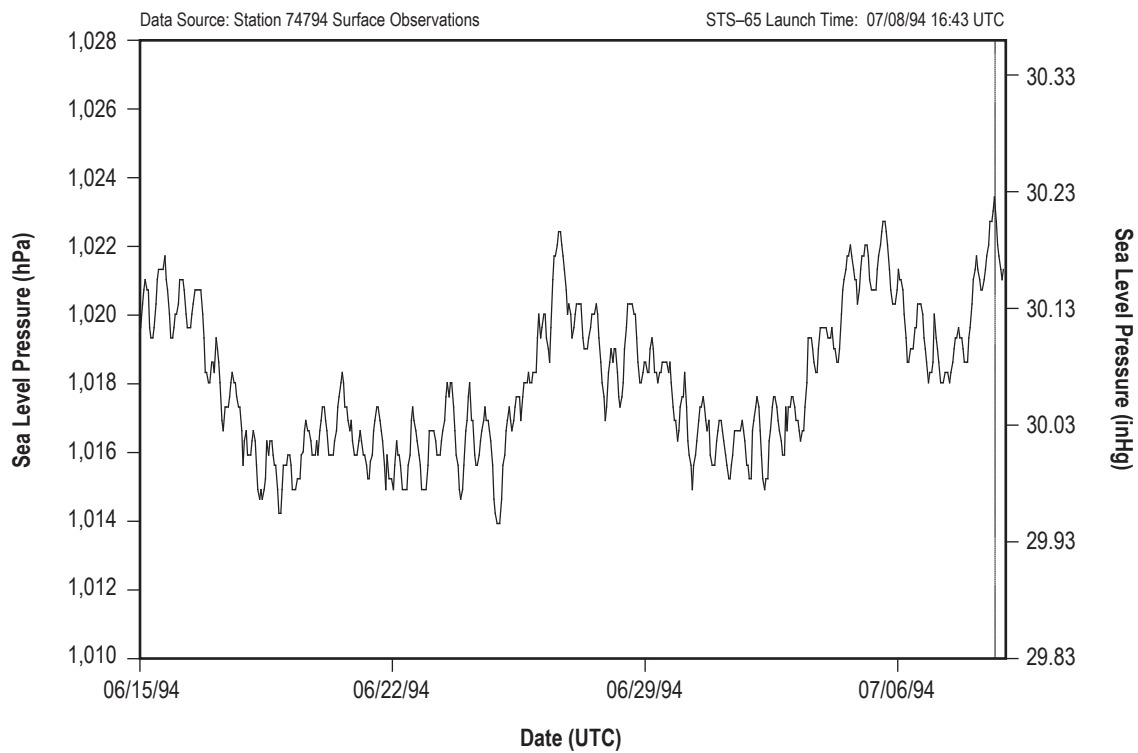


Figure 383. STS-65 hourly sea level pressure.

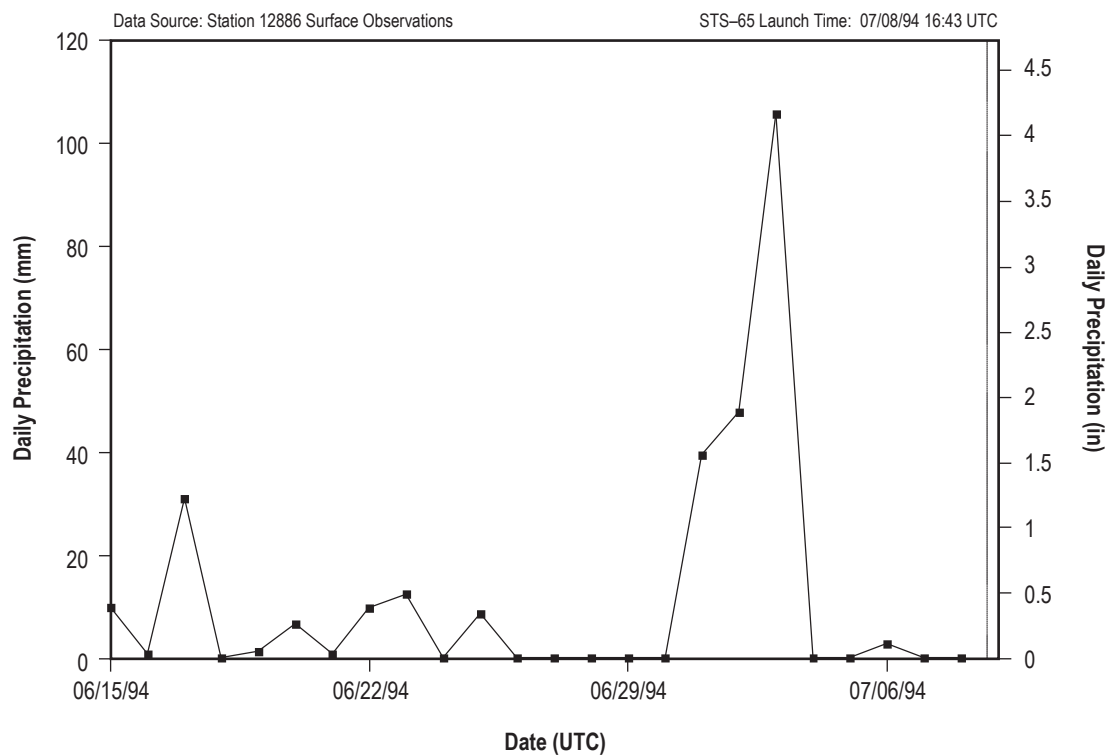


Figure 384. STS-65 daily precipitation totals.

## 5.64 STS–64

STS–64 was the 19th mission for *Discovery* (OV–103). It rolled out to pad 39B on August 19, 1994. STS–64 was exposed on the pad for 22 days and launched on September 9, 1994, at 22:23 UTC.

### 5.64.1 STS–64 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–64 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.64.2 STS–64 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–64 are shown in table 131. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 131. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 131. STS–64 L–0 surface observations.

Temperature	28.9 °C (84 °F)
Relative humidity	75%
Sea level pressure	1,016.9 hPa (30.03 inHg)
Wind speed	3.8. m/s (7.3 kt) (1-min average)
Wind direction	111° (1-min average)
Sky condition	1/8 cumulonimbus at 762 m (2,500 ft); 1/8 altocumulus at 2,743 m (9,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.64.3 STS–64 Pad Exposure Period Hourly Meteorological Parameters

Figures 385–390 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–64 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 132. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 132. STS–64 pad exposure period hourly extremes.

Minimum temperature	22.2 °C (72 °F)
Maximum temperature	33.3 °C (92 °F)
Minimum relative humidity	50%
Maximum relative humidity	93%
Minimum sea level pressure	1,012.9 hPa (29.91 inHg)
Maximum sea level pressure	1,022 hPa (30.18 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 121°
Total precipitation	63.2 mm (2.49 in)

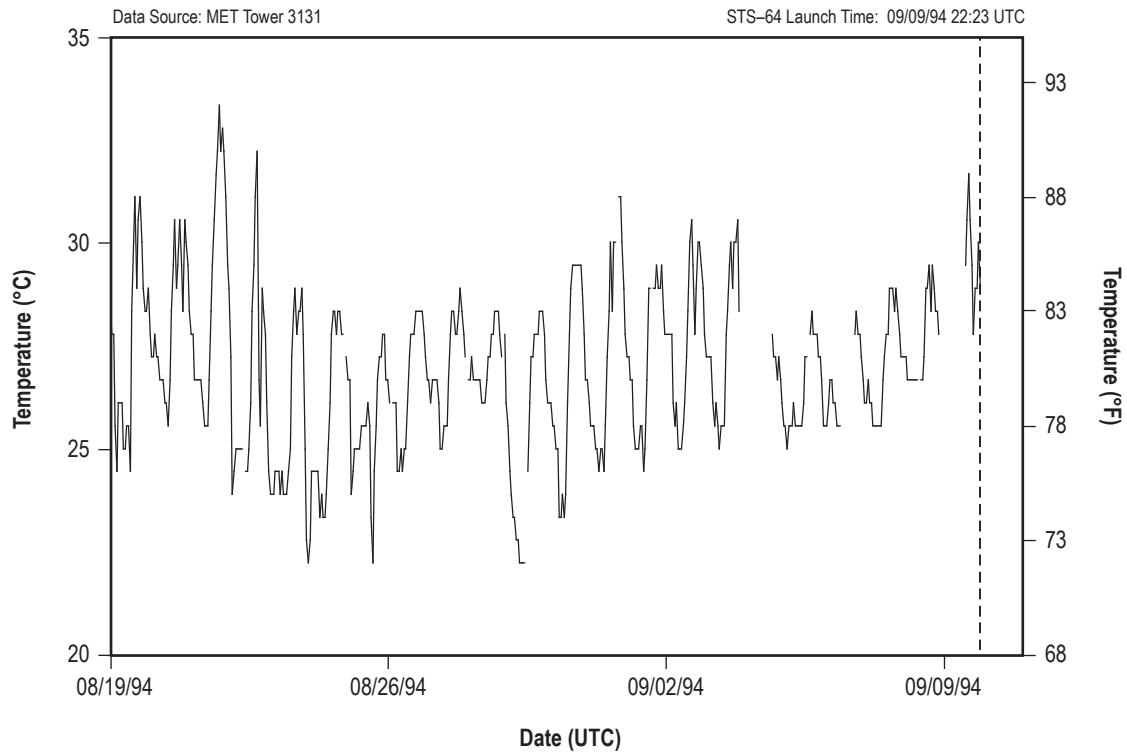


Figure 385. STS-64 hourly surface temperature.

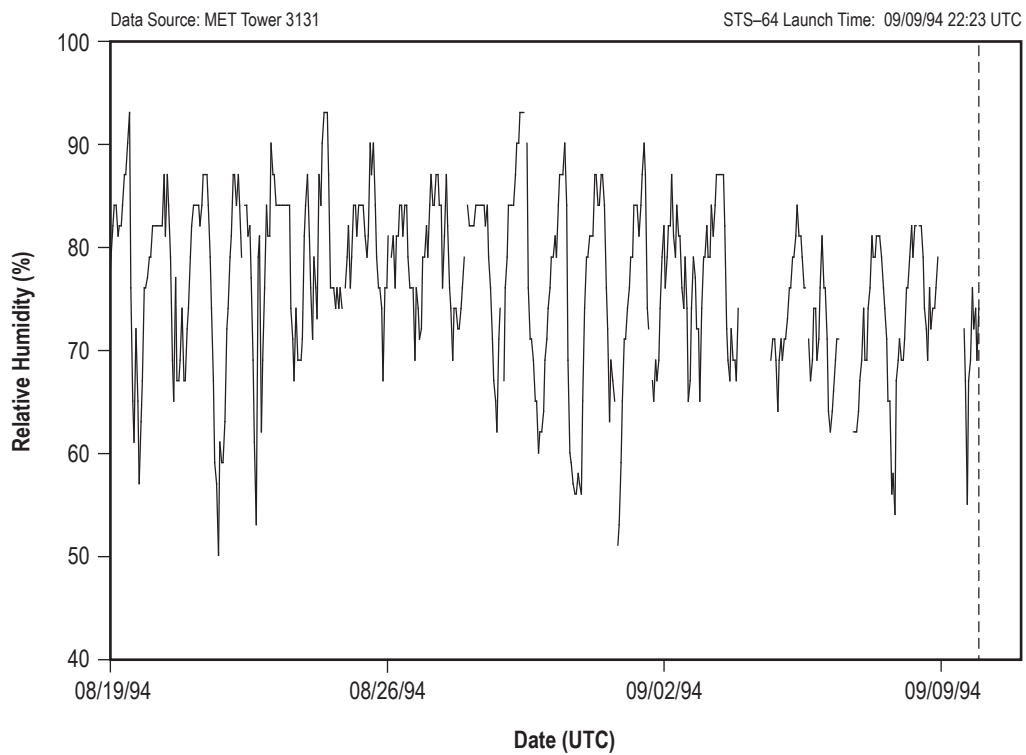


Figure 386. STS-64 hourly surface relative humidity.

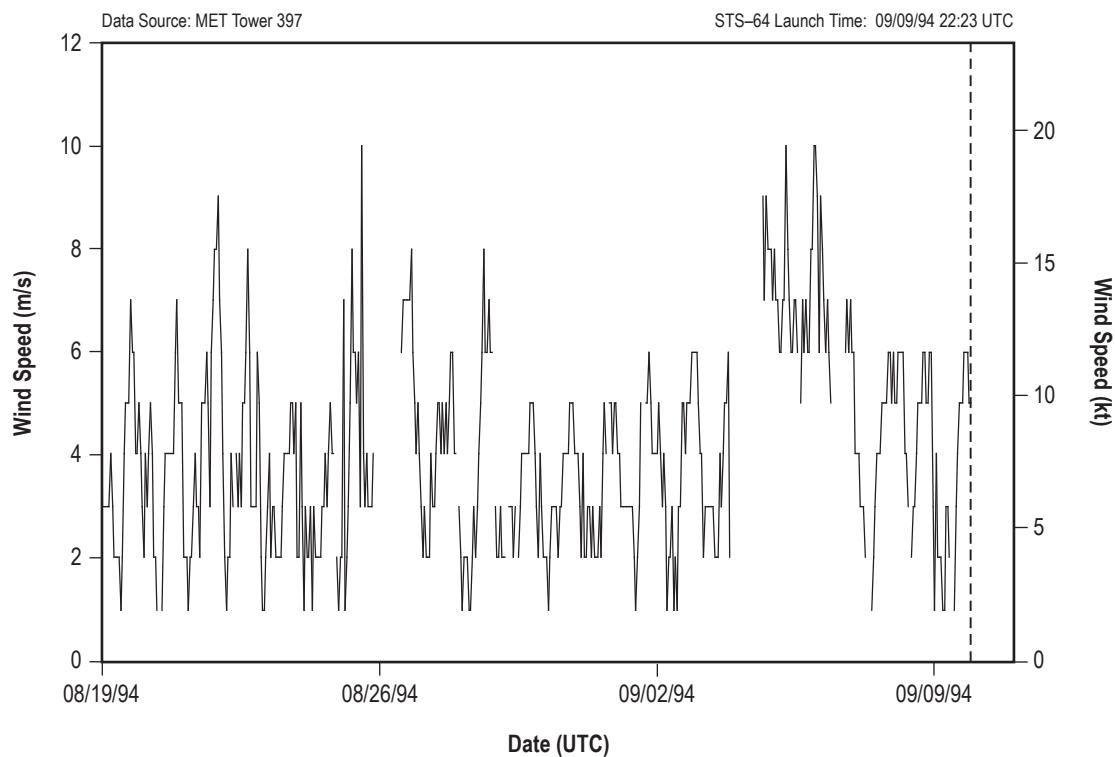


Figure 387. STS-64 hourly surface wind speed.

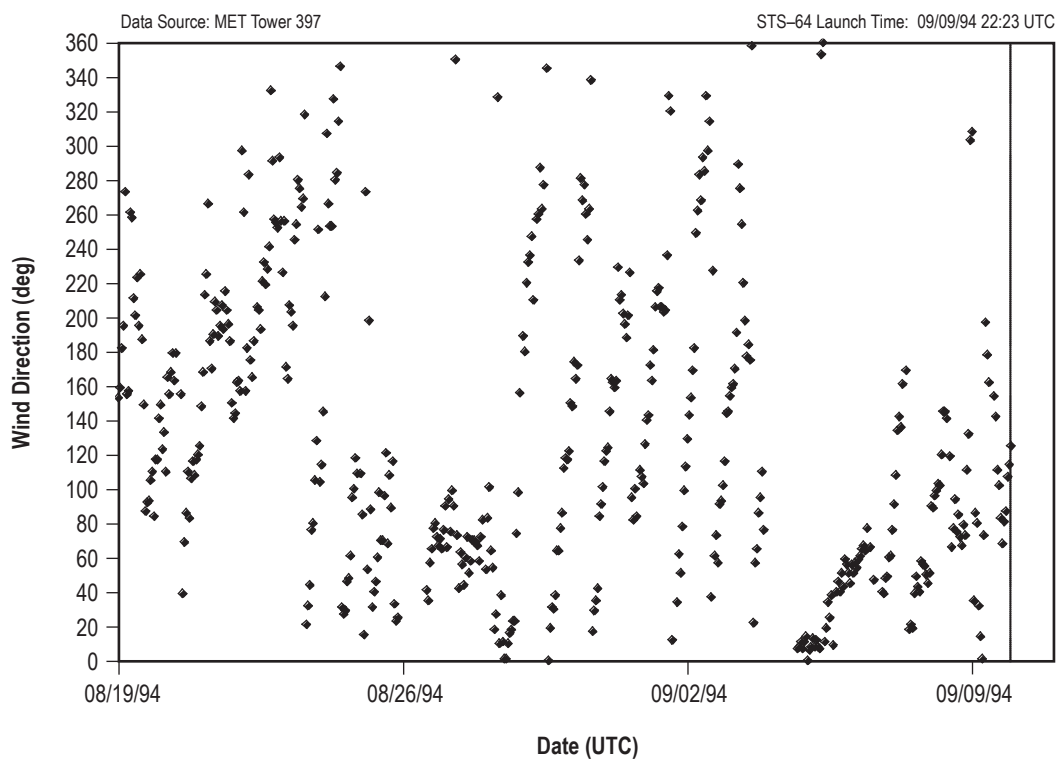


Figure 388. STS-64 hourly surface wind direction.



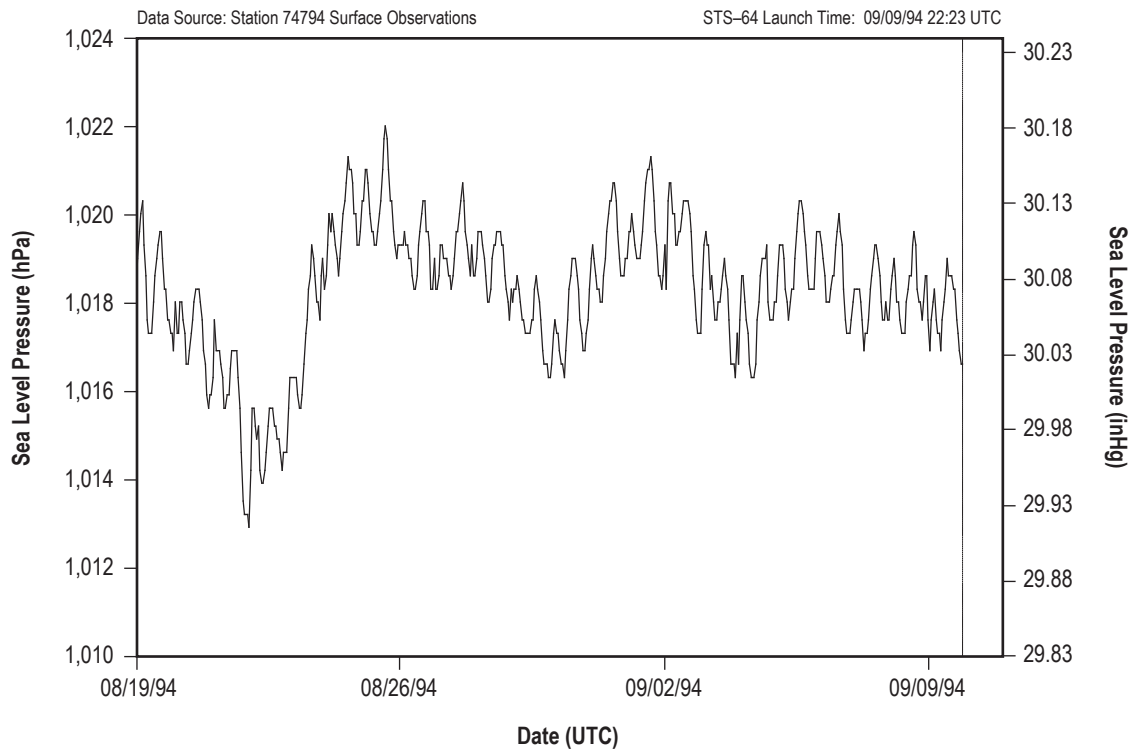


Figure 389. STS-64 hourly sea level pressure.

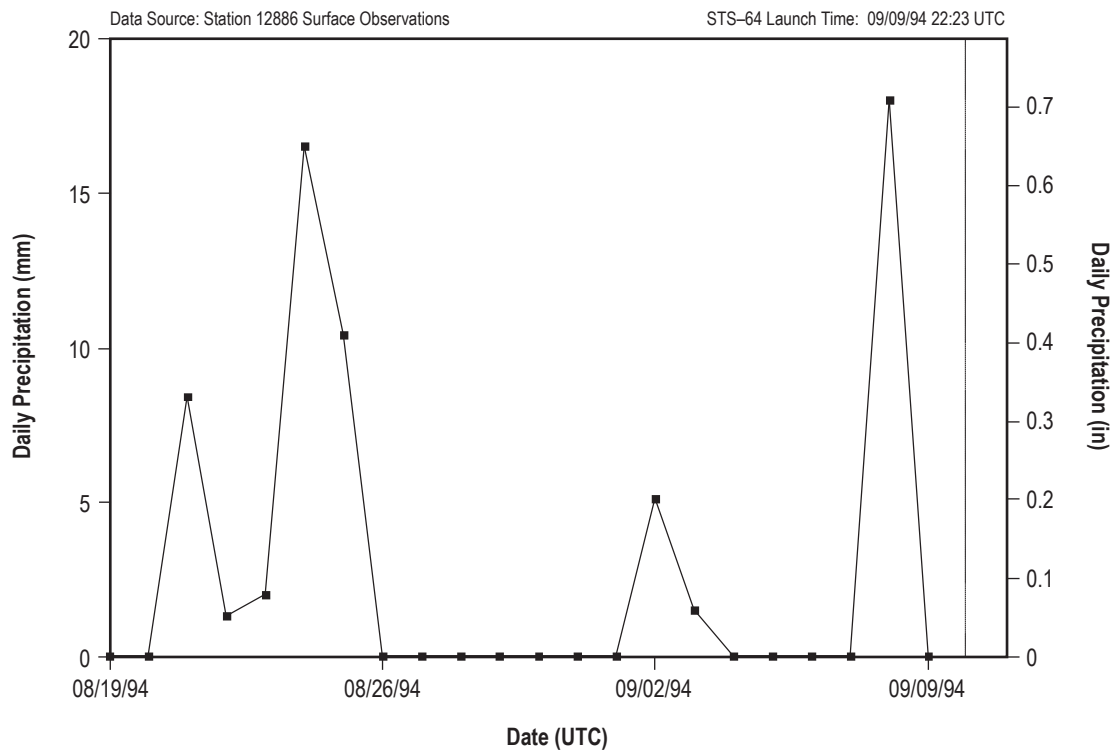


Figure 390. STS-64 daily precipitation totals.

## 5.65 STS–68

STS–68 was the seventh mission for *Endeavour* (OV–105). It rolled out to pad 39A the first time on July 27, 1994. It was rolled back from the pad on August 24, 1994. STS–68 rolled out to pad 39A the second time on September 13, 1994. STS–68 was exposed on the pad for a total of 46 days (29 days after the first rollout and 17 days after the second rollout) and launched on September 30, 1994, at 11:16 UTC.

### 5.65.1 STS–68 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–68 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.65.2 STS–68 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–68 are shown in table 133. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 133. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 133. STS–68 L–0 surface observations.

Temperature	25.8 °C (78.4 °F)
Relative humidity	75%
Sea level pressure	1,016.7 hPa (30.02 inHg)
Wind speed	5.2 m/s (10 kt) (1-min average)
Wind direction	70° (1-min average)
Sky condition	1/8 cumulus at 750 m (2,461 ft); 4/8 cirrostratus at 9,000 m (29,527 ft)
Visibility	12.9 km (6.9 nmi)

### 5.65.3 STS–68 Pad Exposure Period Hourly Meteorological Parameters

Figures 391–396 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–68 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 134. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 394 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 134. STS–68 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	33.3 °C (92 °F)
Minimum relative humidity	50%
Maximum relative humidity	100%
Minimum sea level pressure	1,010.5 hPa (29.84 inHg)
Maximum sea level pressure	1,021.7 hPa (30.17 inHg)
Maximum wind speed and associated wind direction	14.9 m/s (29 kt) 104°
Total precipitation	302.5 mm (11.91 in)

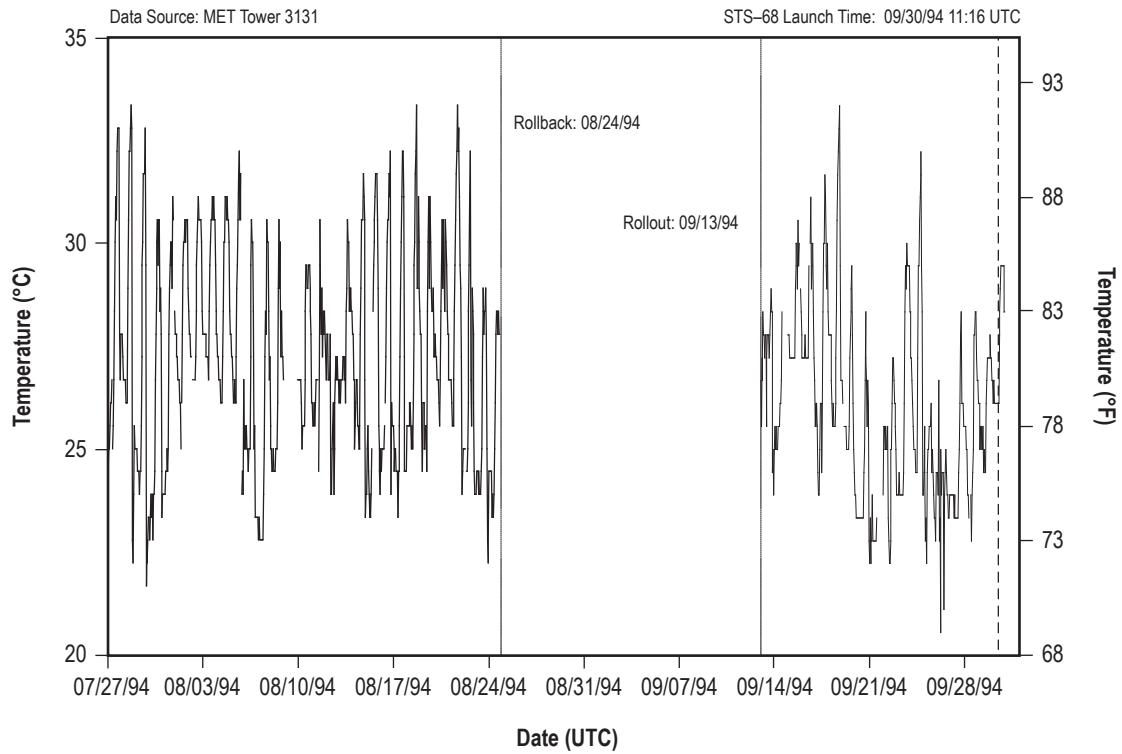


Figure 391. STS-68 hourly surface temperature.

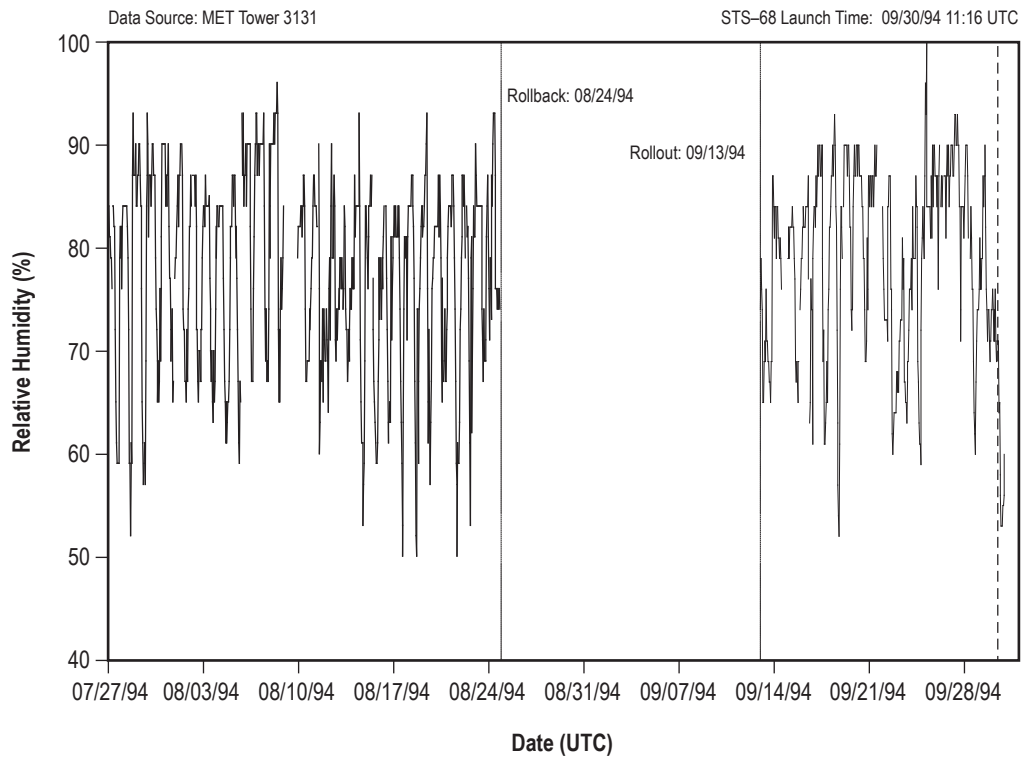


Figure 392. STS-68 hourly surface relative humidity.

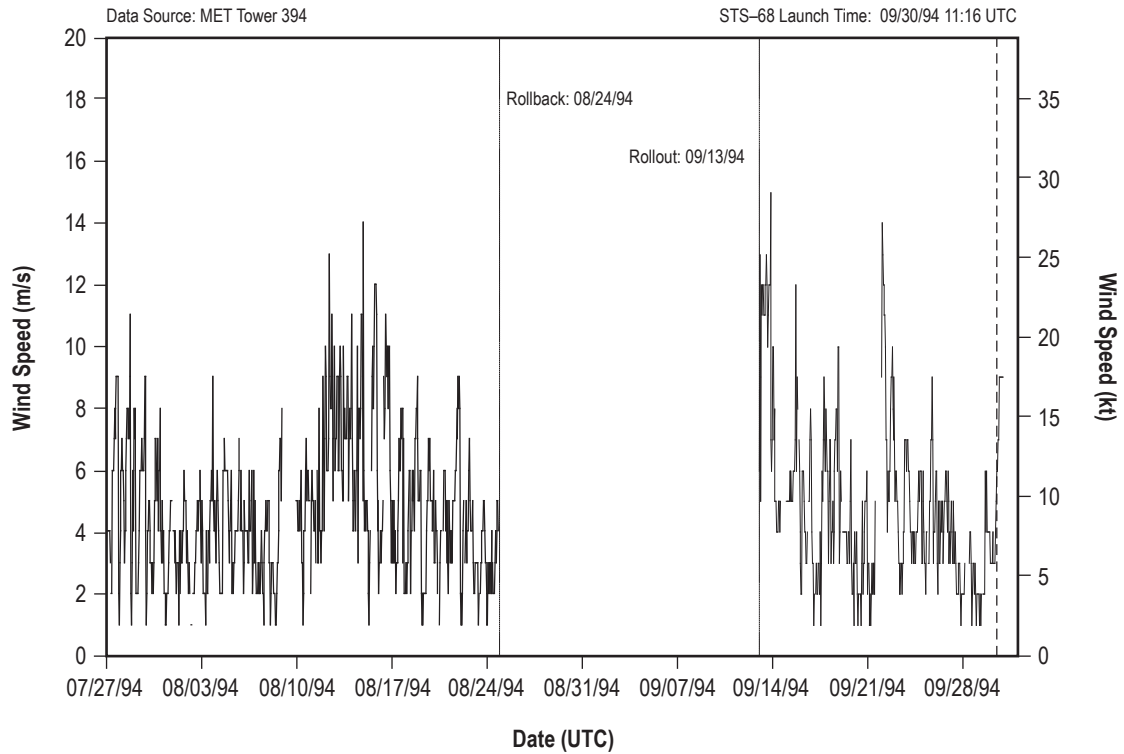


Figure 393. STS-68 hourly surface wind speed.

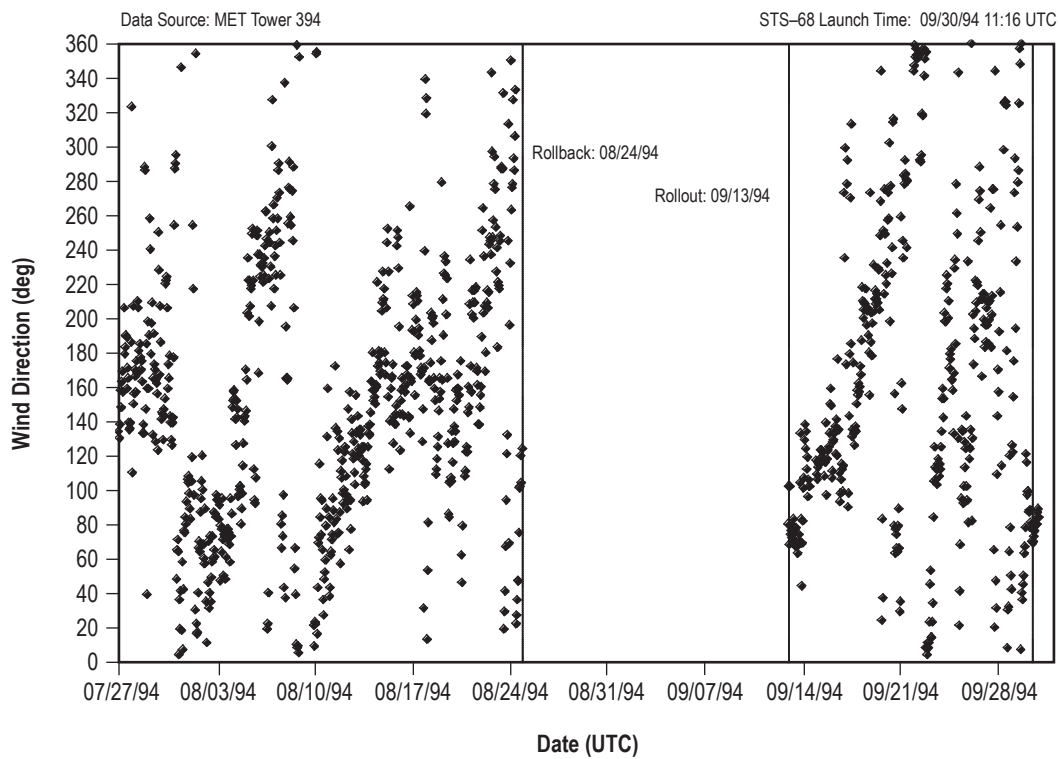


Figure 394. STS-68 hourly surface wind direction.

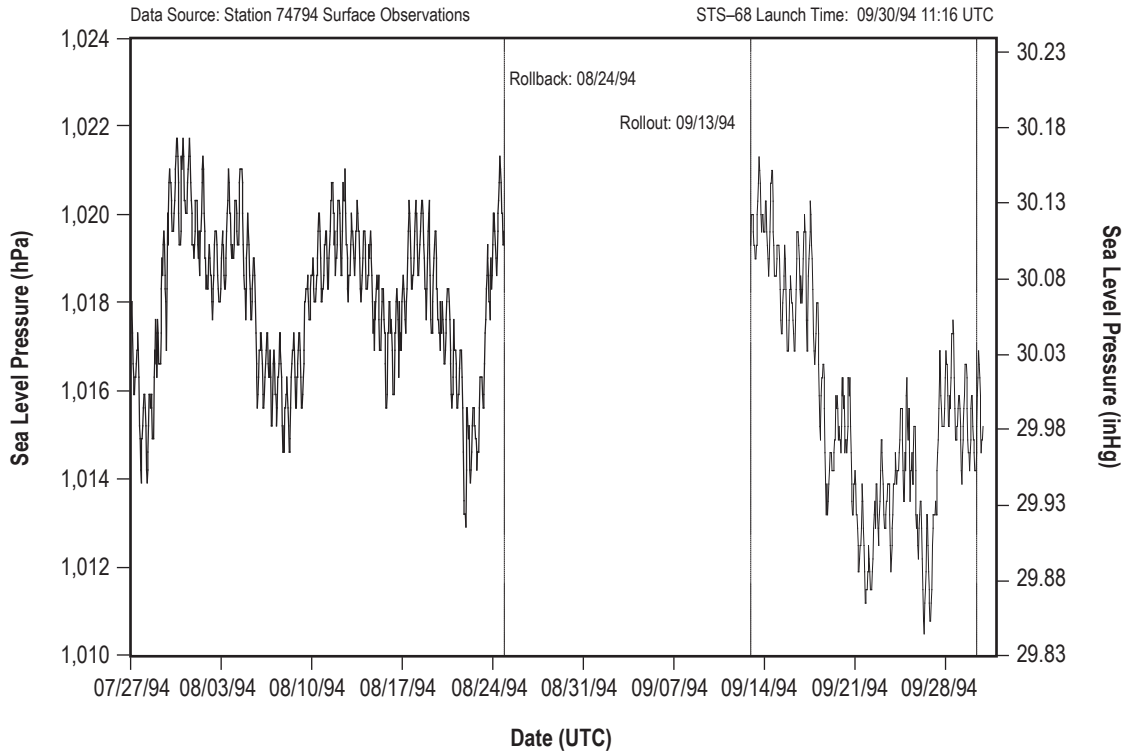


Figure 395. STS-68 hourly sea level pressure.

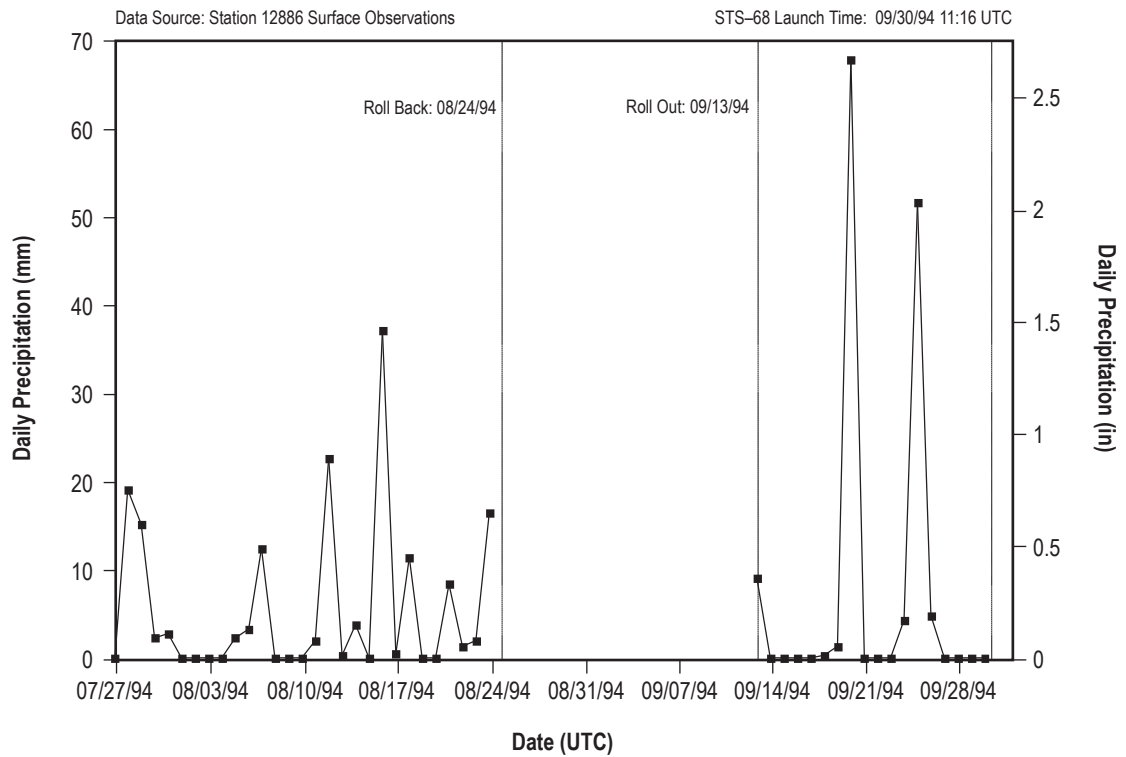


Figure 396. STS-68 daily precipitation totals.

## 5.66 STS–66

STS–66 was the 13th mission for *Atlantis* (OV–104). It rolled out to pad 39B on October 9, 1994. STS–66 was exposed on the pad for 26 days and launched on November 3, 1994, at 17:00 UTC.

### 5.66.1 STS–66 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–66 exposure period. Additionally, temperature, dewpoint and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.66.2 STS–66 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–66 are shown in table 135. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 135. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 135. STS–66 L–0 surface observations.

Temperature	24.4 °C (76 °F)
Relative humidity	65%
Sea level pressure	1,022.4 hPa (30.19 inHg)
Wind speed	5.2 m/s (10 kt) (1-min average)
Wind direction	65° (1-min average)
Sky condition	1/8 stratocumulus at 1,350 m (4,429 ft)
Visibility	16.1 km (8.7 nmi)

### 5.66.3 STS–66 Pad Exposure Period Hourly Meteorological Parameters

Figures 397–402 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–66 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 136. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 136. STS–66 pad exposure period hourly extremes.

Minimum temperature	16.1 °C (61 °F)
Maximum temperature	32.2 °C (90 °F)
Minimum relative humidity	44%
Maximum relative humidity	96%
Minimum sea level pressure	1,010.8 hPa (29.85 inHg)
Maximum sea level pressure	1,023 hPa (30.21 inHg)
Maximum wind speed and associated wind direction	19 m/s (37 kt) 45°
Total precipitation	206.5 mm (8.13 in)

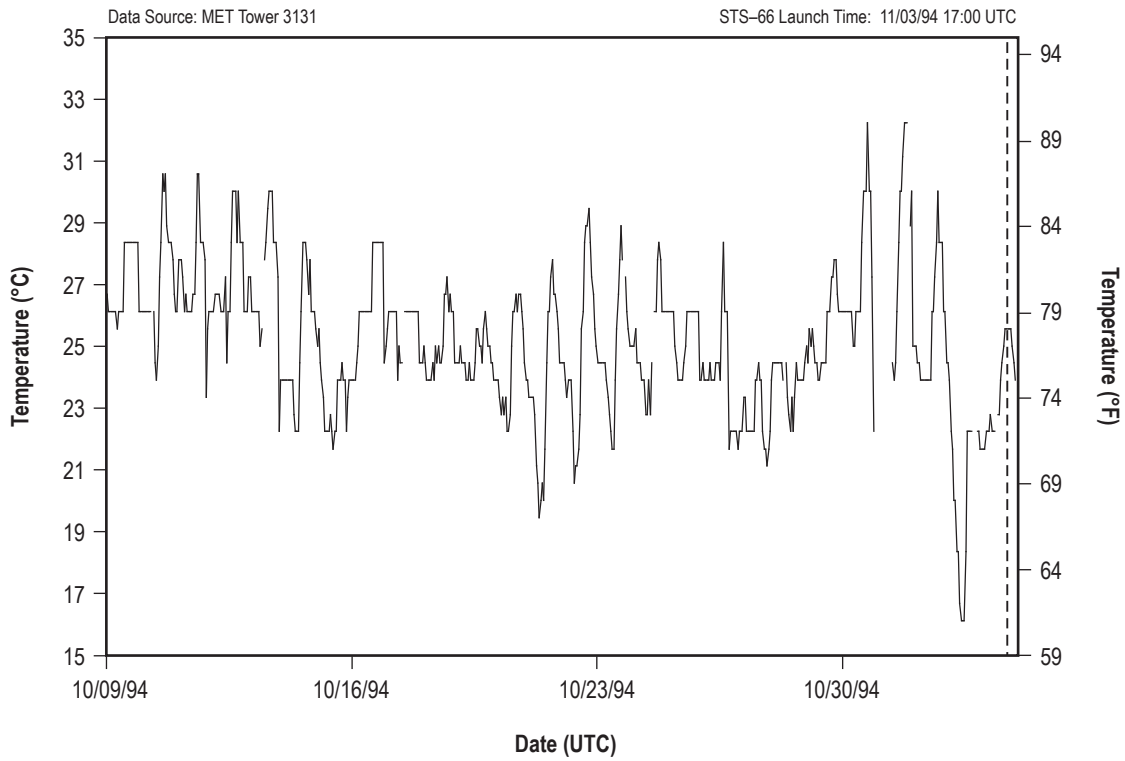


Figure 397. STS-66 hourly surface temperature.

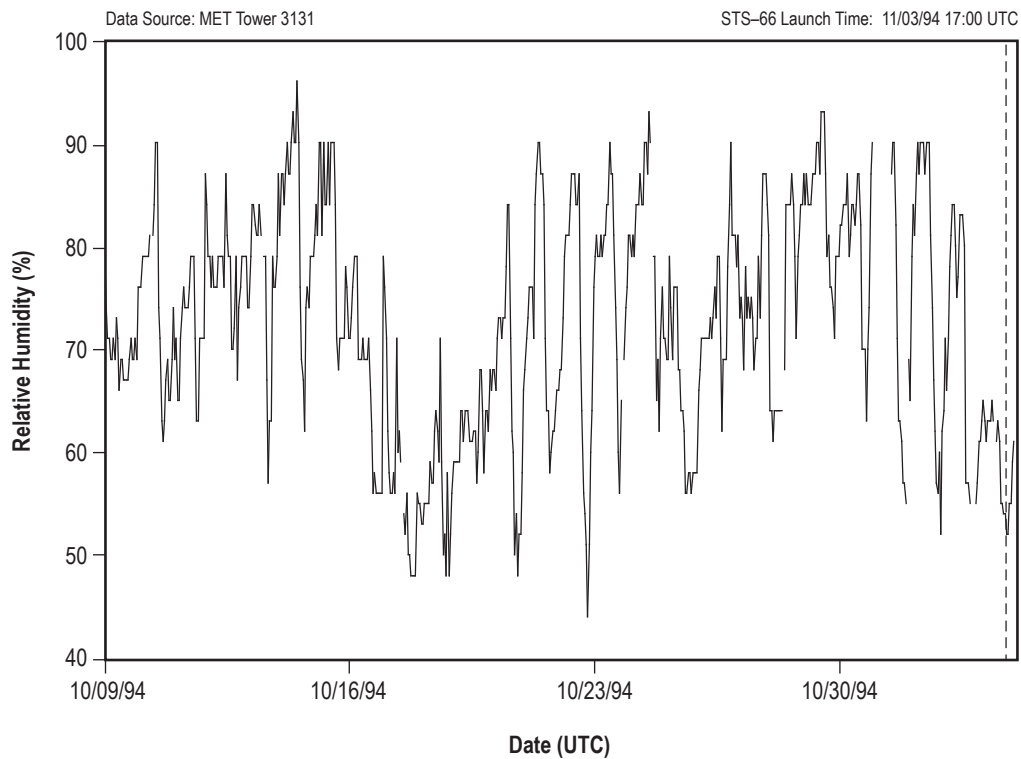


Figure 398. STS-66 hourly surface relative humidity.

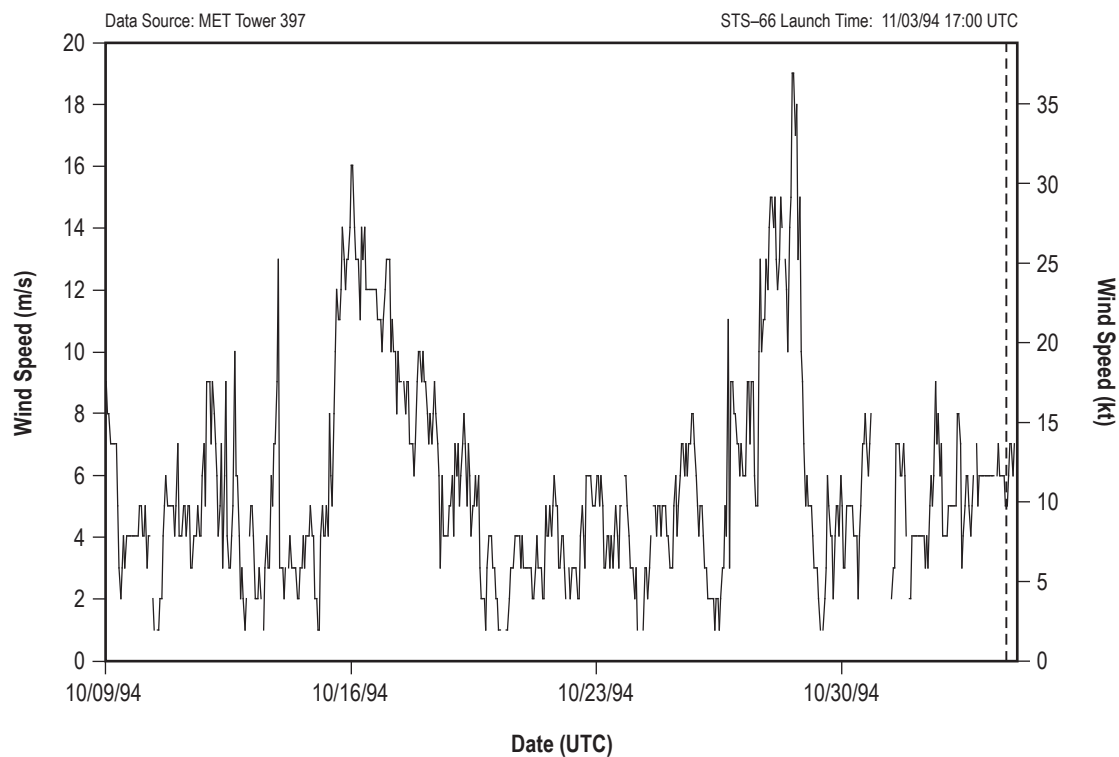


Figure 399. STS-66 hourly surface wind speed.

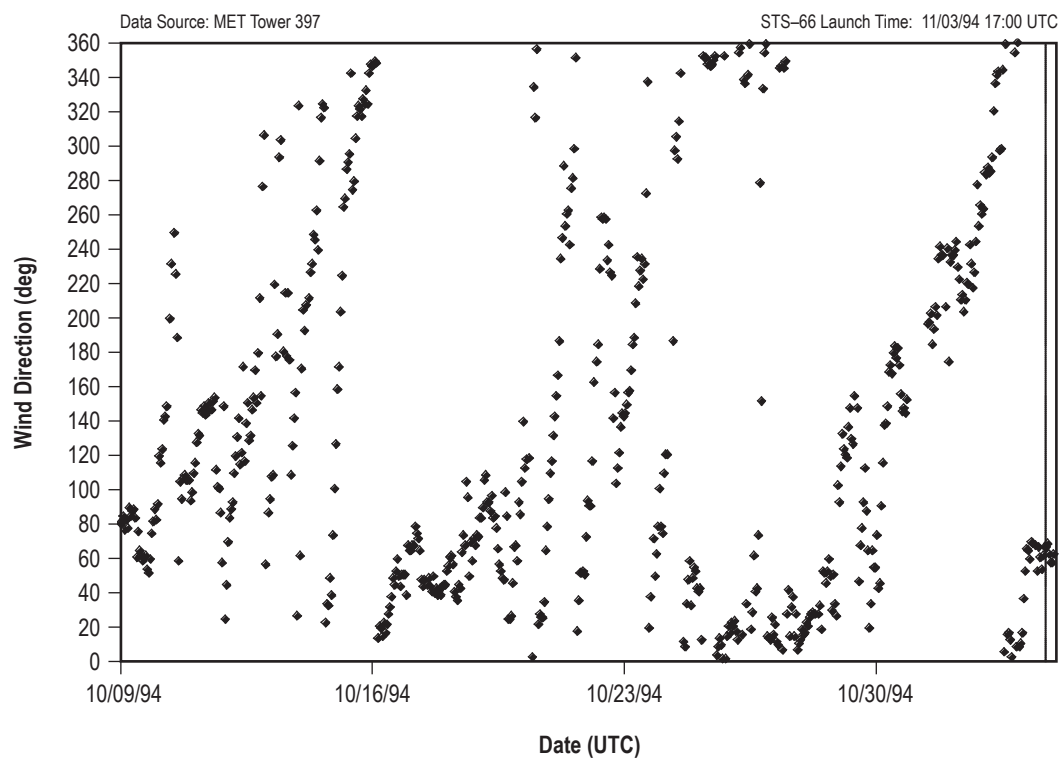


Figure 400. STS-66 hourly surface wind direction.



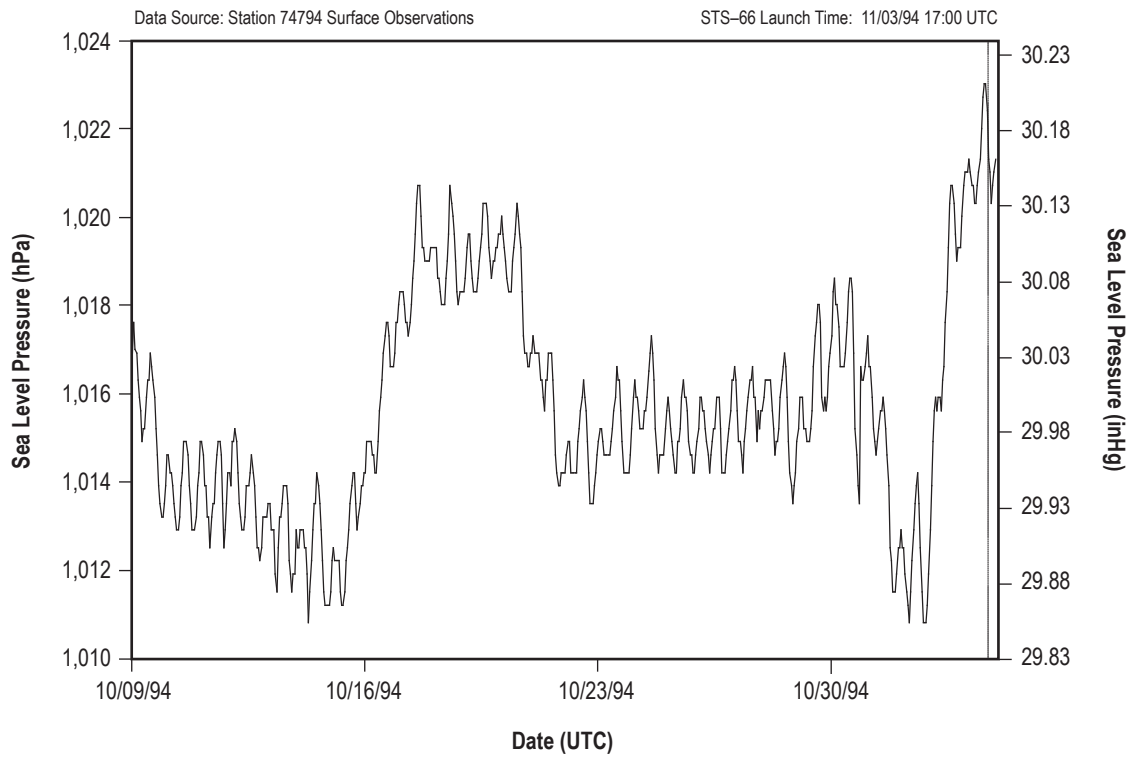


Figure 401. STS-66 hourly sea level pressure.

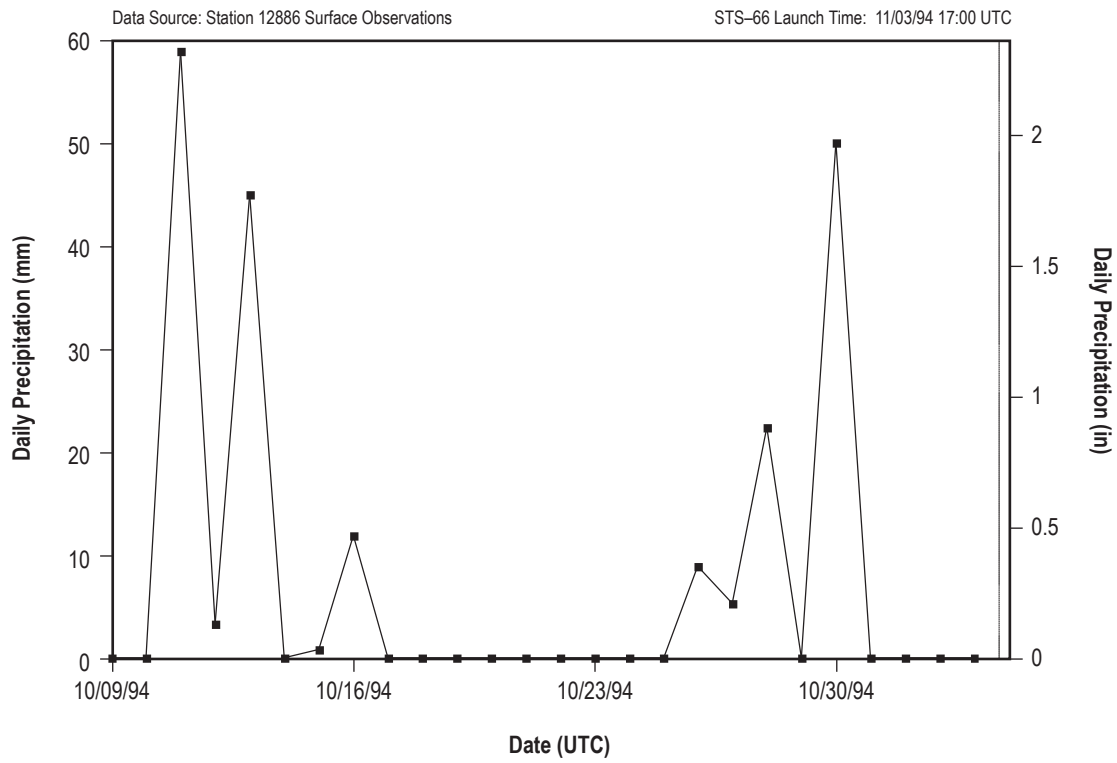


Figure 402. STS-66 daily precipitation totals.

## 5.67 STS–63

STS–63 was the 20th mission for *Discovery* (OV–103). It rolled out to pad 39B on January 10, 1995. STS–63 was exposed on the pad for 24 days and launched on February 3, 1995, at 05:22 UTC.

### 5.67.1 STS–63 Pad Exposure Period Data Archive Sources

Wind speed and direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET tower 3131 at the 16-m (54-ft) level have been archived for the STS–63 exposure period. Additionally, temperature, dewpoint, and relative humidity measured at MET tower 3131 at the 16-m (54-ft) level have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.67.2 STS–63 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–63 are shown in table 137. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 137. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 137. STS–63 L–0 surface observations.

Temperature	13.2 °C (55.8 °F)
Relative humidity	83%
Sea level pressure	1,018.7 hPa (30.08 inHg)
Wind speed	5.2 m/s (10 kt) (1-min average)
Wind direction	239° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi)

### 5.67.3 STS–63 Pad Exposure Period Hourly Meteorological Parameters

Figures 403–408 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–63 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 138. Temperature and relative humidity data in this section are from MET tower 3131 (the closest available source to the pad for this mission) at the 16-m (54-ft) level. Wind speed and direction data are from MET tower 397 (the closest available to the pad) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 138. STS–63 pad exposure period hourly extremes.

Minimum temperature	3.3 °C (38 °F)
Maximum temperature	24.4 °C (76 °F)
Minimum relative humidity	26%
Maximum relative humidity	98%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,028.8 hPa (30.38 inHg)
Maximum wind speed and associated wind direction	14.9 m/s (29 kt) 212°
Total precipitation	46.7 mm (1.84 in)

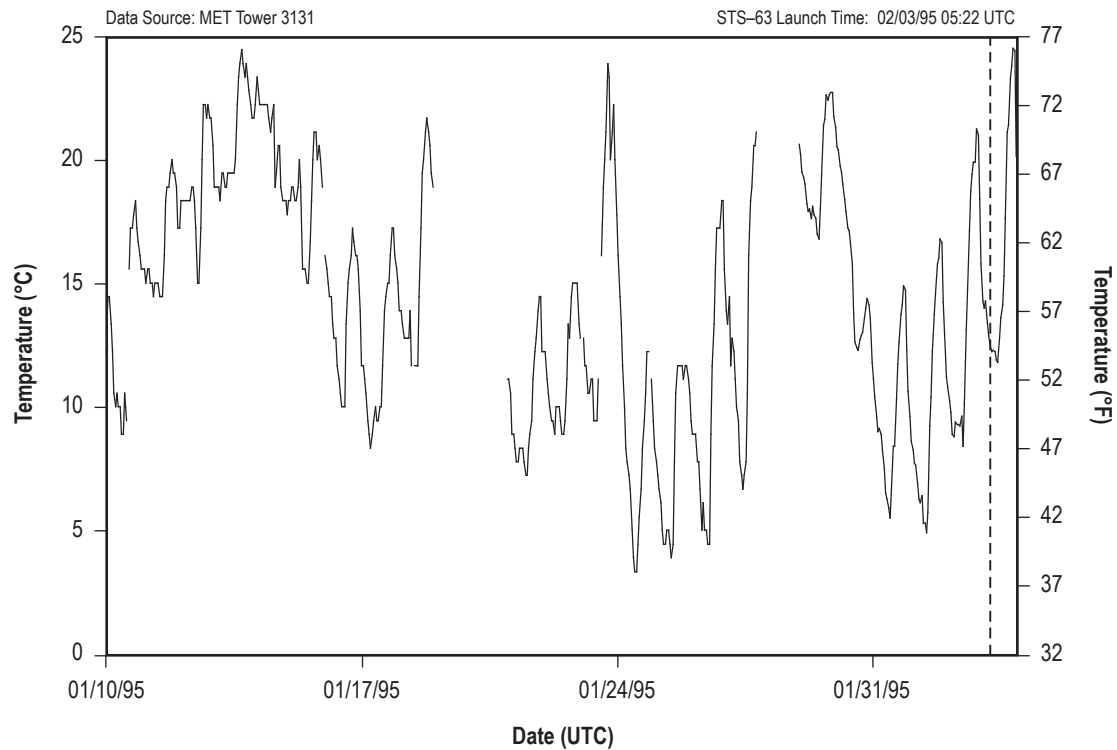


Figure 403. STS-63 hourly surface temperature.

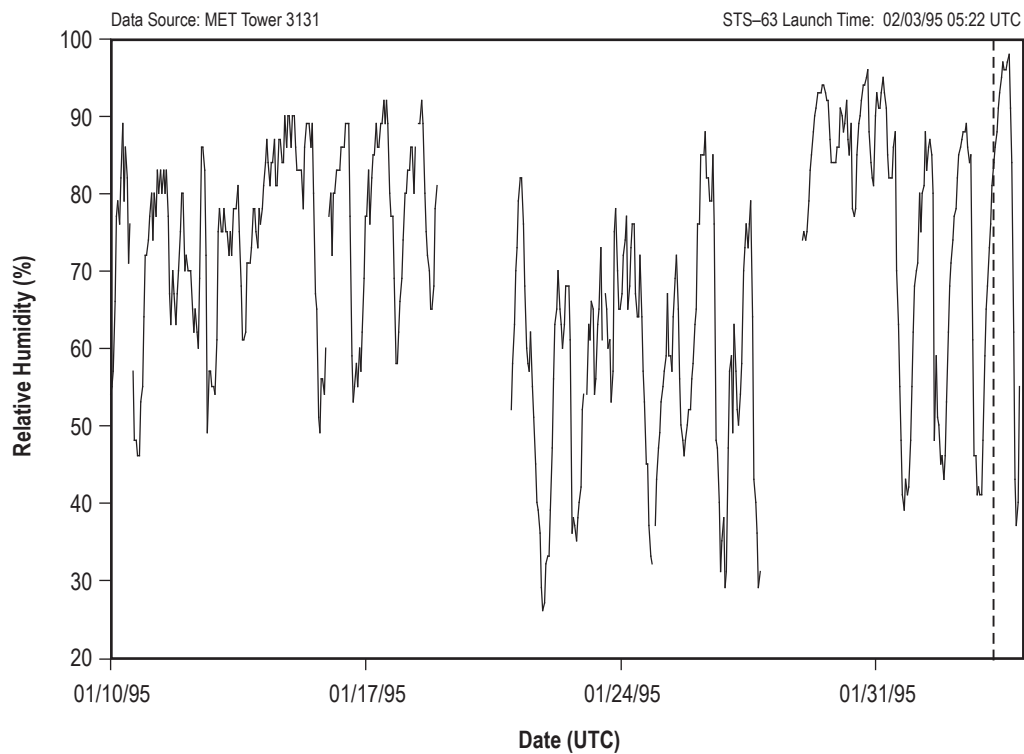


Figure 404. STS-63 hourly surface relative humidity.

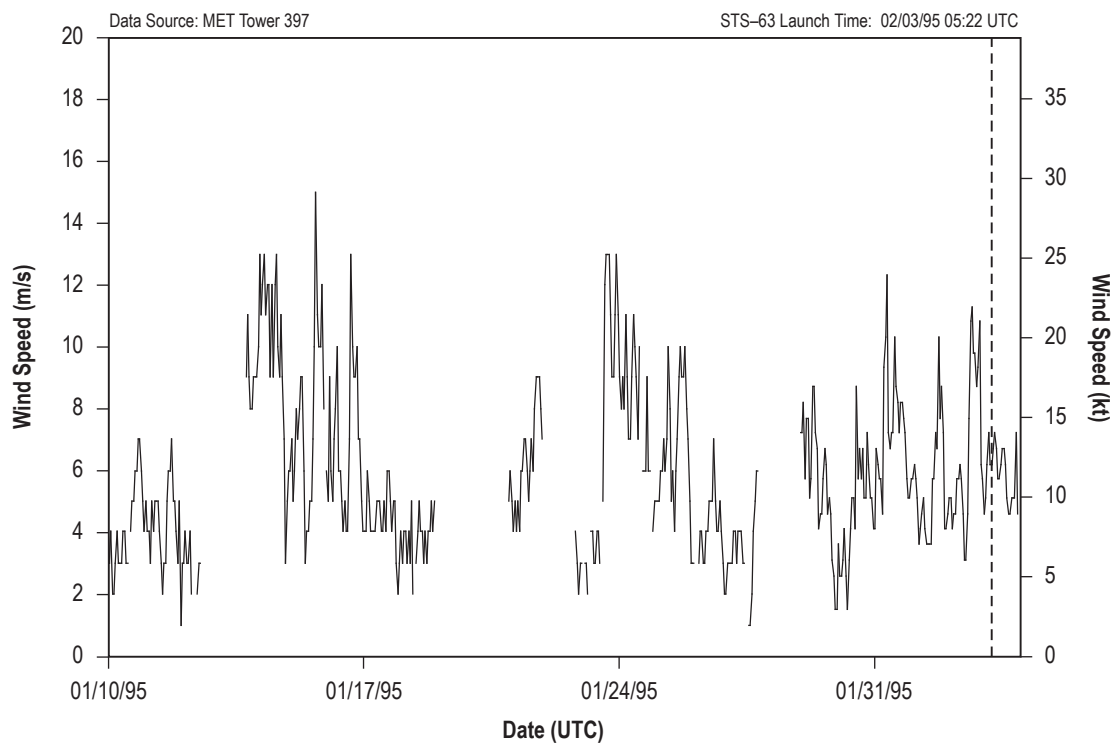


Figure 405. STS-63 hourly surface wind speed.

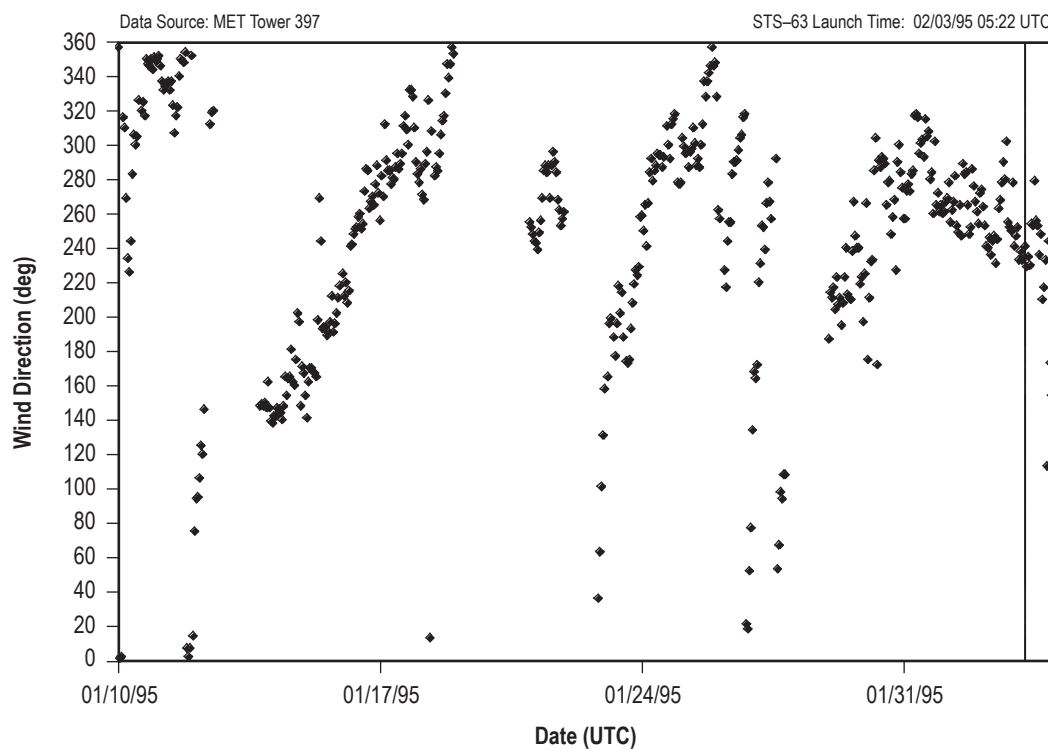


Figure 406. STS-63 hourly surface wind direction.

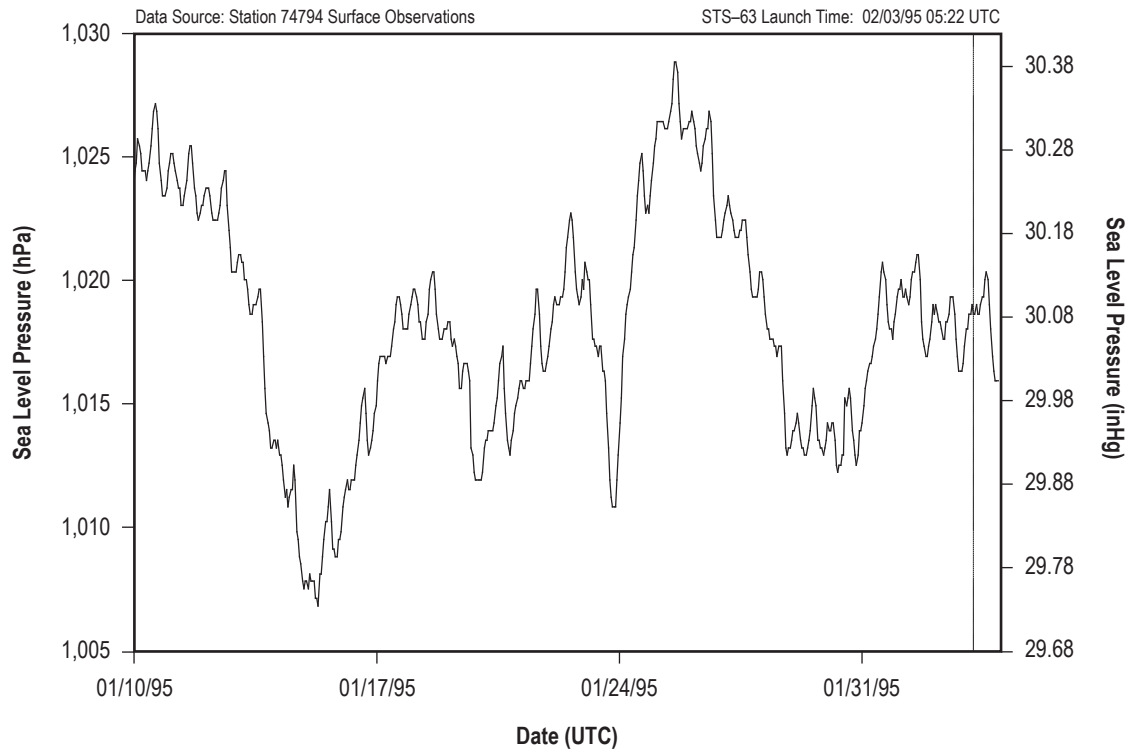


Figure 407. STS-63 hourly sea level pressure.

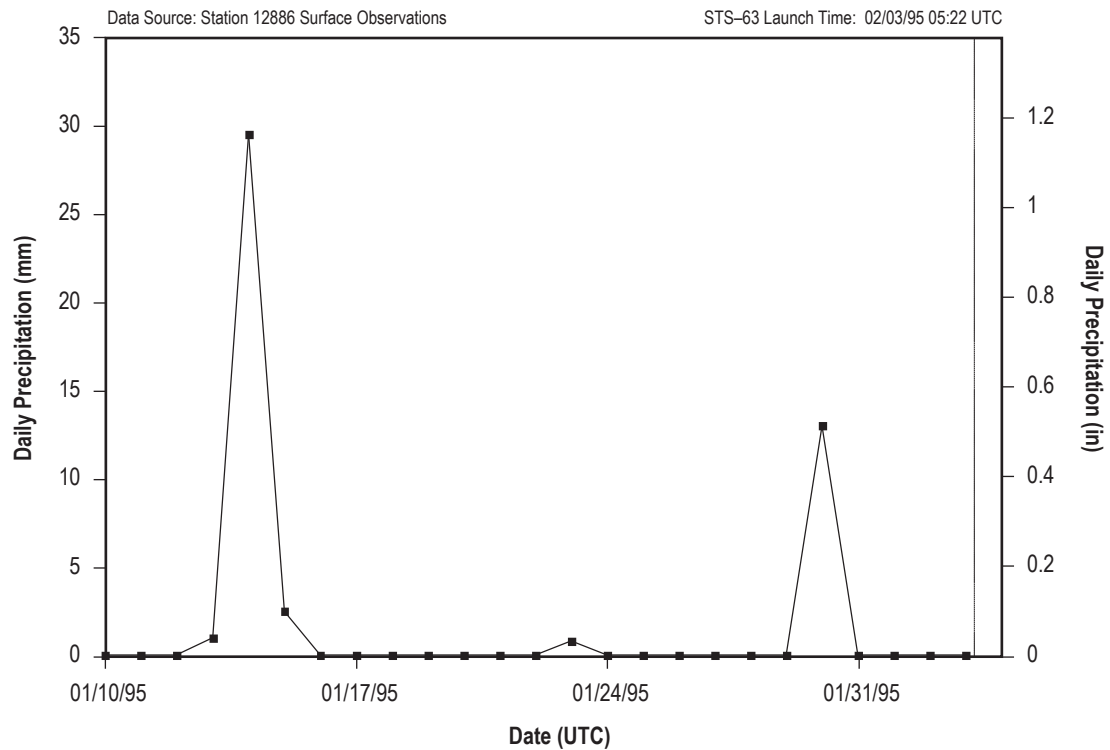


Figure 408. STS-63 daily precipitation totals.

## 5.68 STS–67

STS–67 was the eighth mission for *Endeavour* (OV–105). It rolled out to pad 39A on February 8, 1995. STS–67 was exposed on the pad for 22 days and launched on March 2, 1995, at 06:38 UTC.

### 5.68.1 STS–67 Pad Exposure Period Data Archive Sources

Temperature, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–67 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.68.2 STS–67 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–67 are shown in table 139. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 139. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 139. STS–67 L–0 surface observations.

Temperature	17.6 °C (63.6 °F)
Relative humidity	87%
Sea level pressure	1,014 hPa (29.94 inHg)
Wind speed	4.8 m/s (9.3 kt) (1-min average)
Wind direction	257° (1-min average)
Sky condition	1/8 stratocumulus at 518 m (1,700 ft)
Visibility	16.1 km (8.7 nmi)

### 5.68.3 STS–67 Pad Exposure Period Hourly Meteorological Parameters

Figures 409–414 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–67 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 140. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 393 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 140. STS–67 pad exposure period hourly extremes.

Minimum temperature	0.6 °C (33 °F)
Maximum temperature	25.6 °C (78 °F)
Minimum relative humidity	22%
Maximum relative humidity	97%
Minimum sea level pressure	1,008.8 hPa (29.79 inHg)
Maximum sea level pressure	1,029.5 hPa (30.4 inHg)
Maximum wind speed and associated wind direction	17 m/s (33 kt) 17°
Total precipitation	27.4 mm (1.08 in)

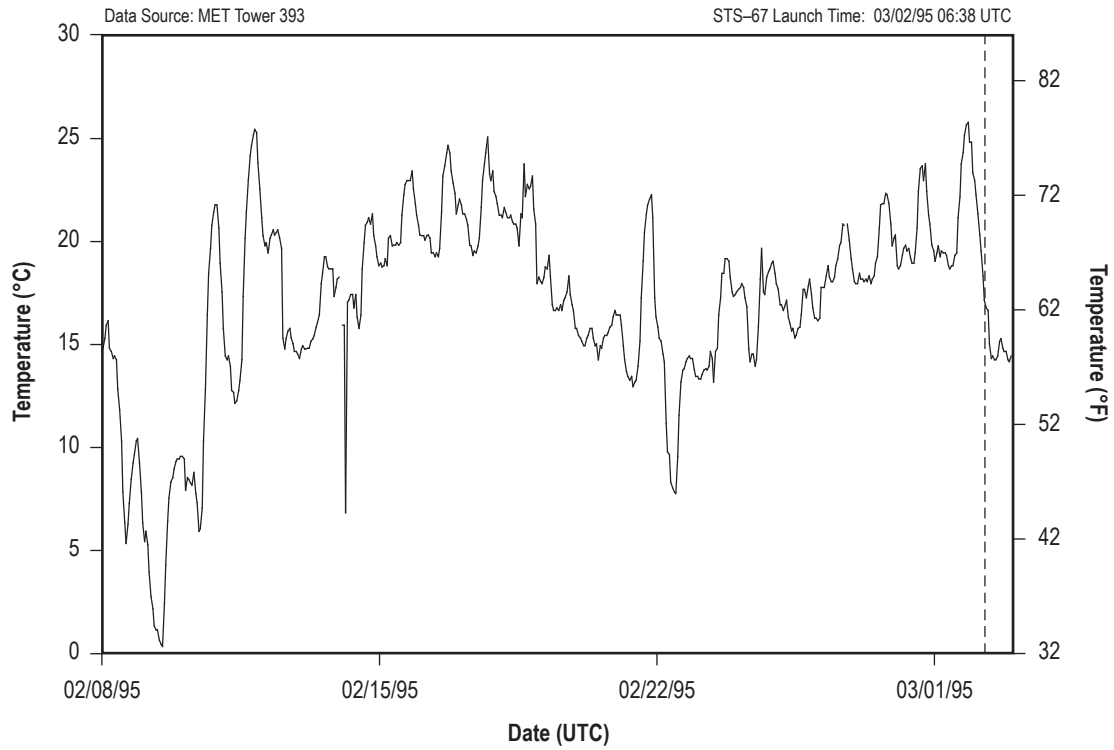


Figure 409. STS-67 hourly surface temperature.

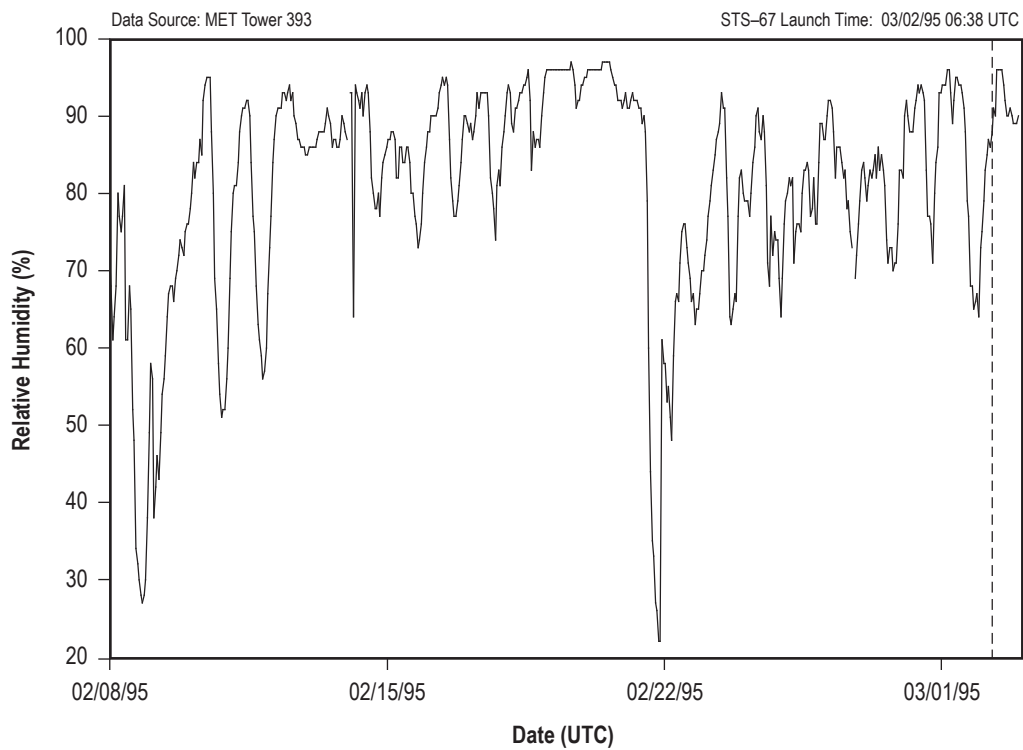


Figure 410. STS-67 hourly surface relative humidity.

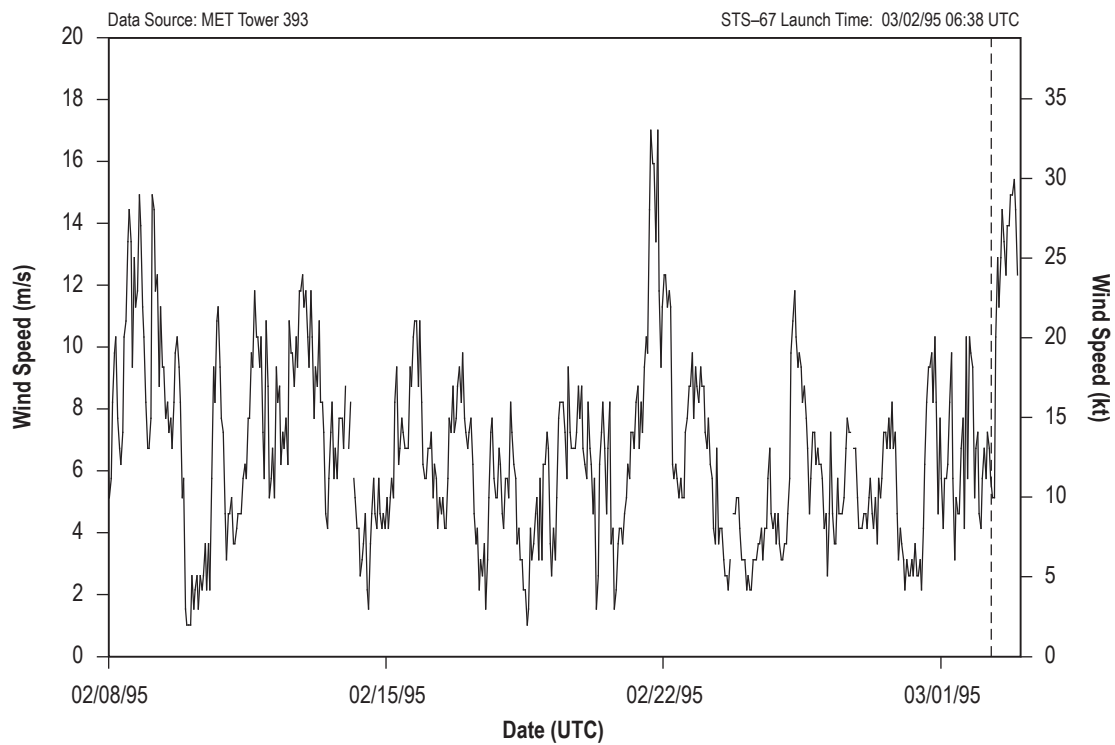


Figure 411. STS-67 hourly surface wind speed.

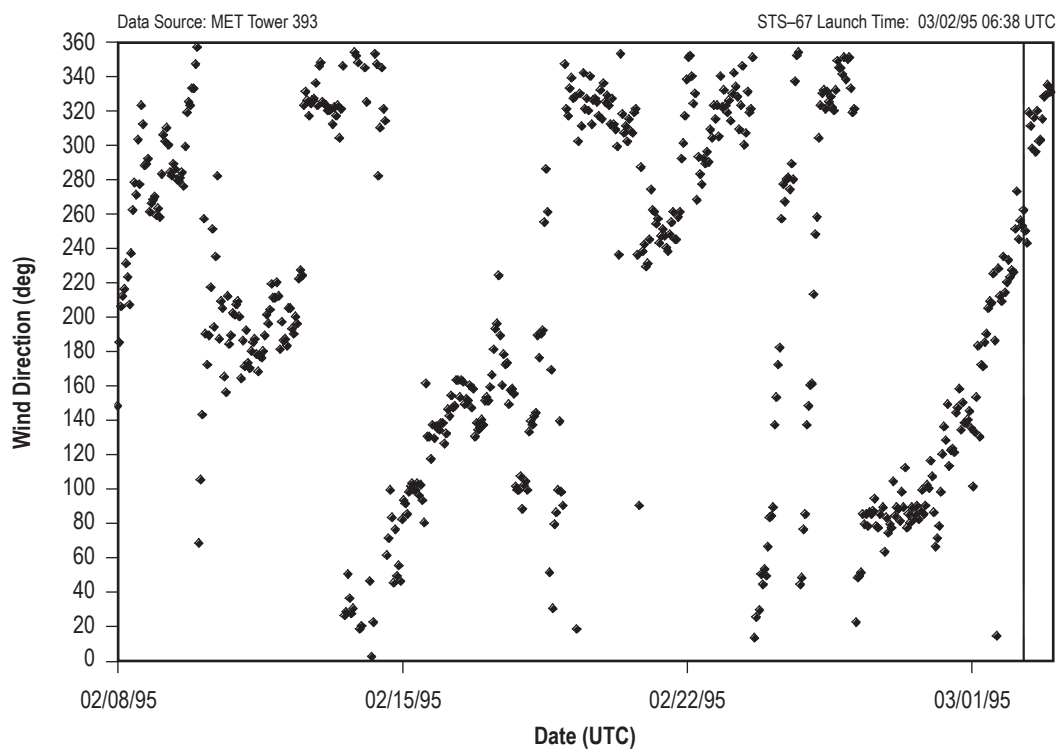


Figure 412. STS-67 hourly surface wind direction.



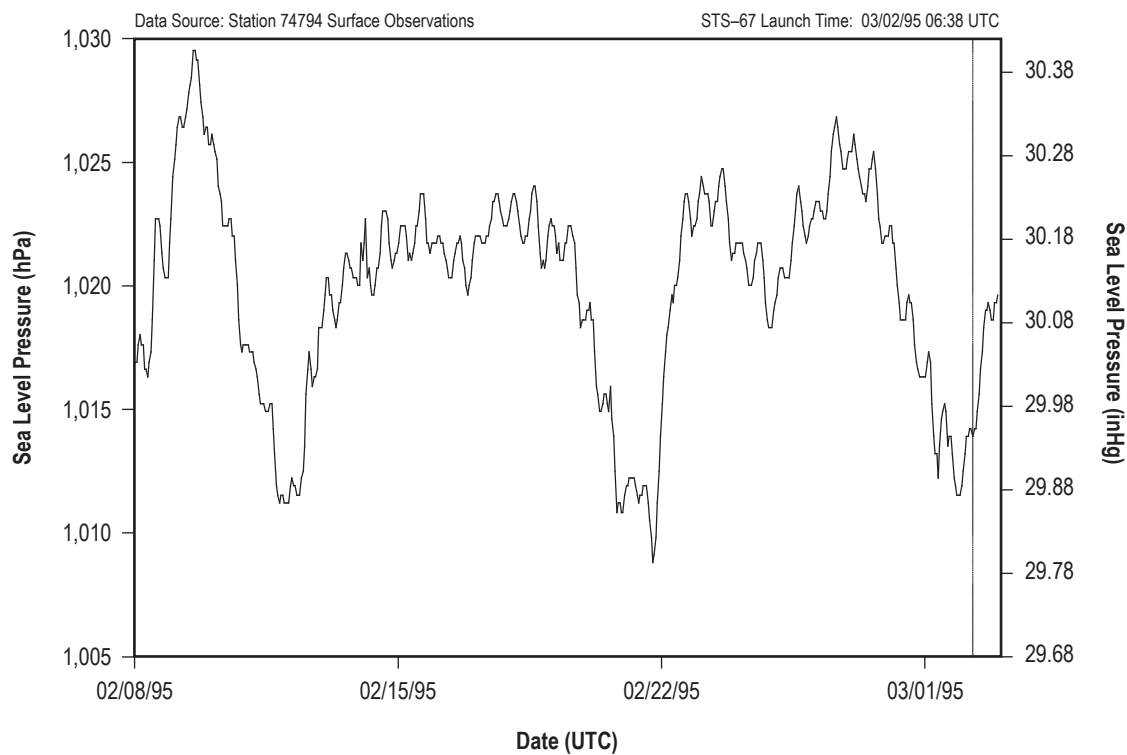


Figure 413. STS-67 hourly sea level pressure.

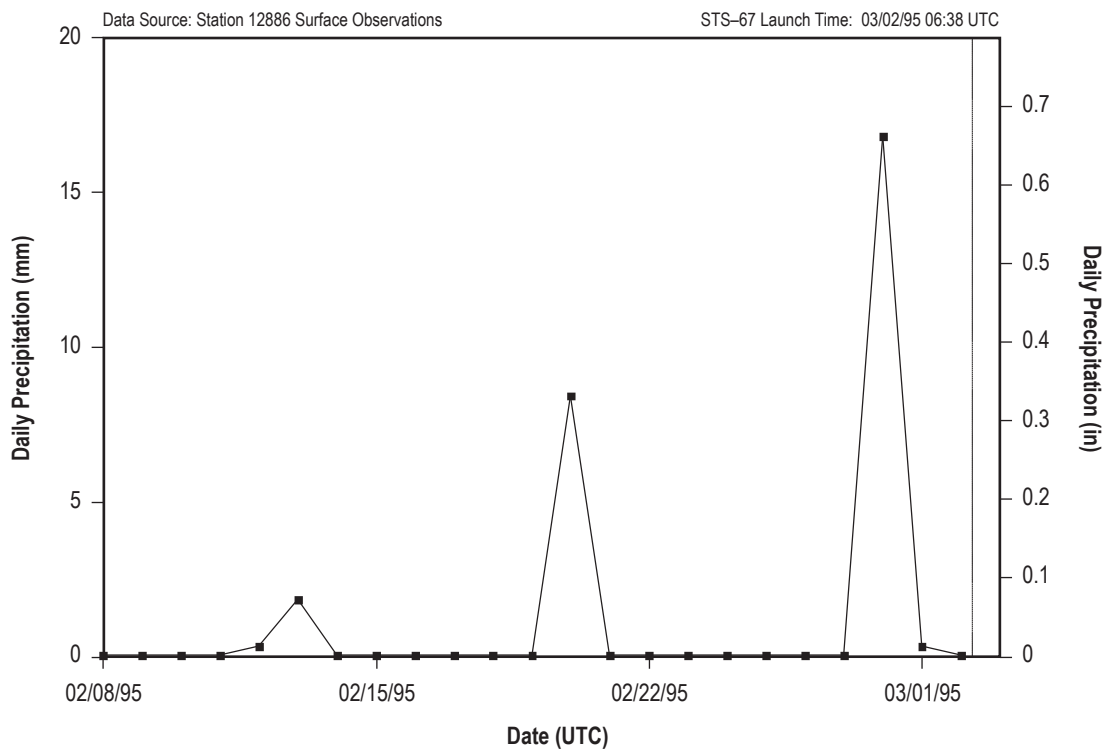


Figure 414. STS-67 daily precipitation totals.

## 5.69 STS-71

STS-71 was the 14th mission for *Atlantis* (OV-104). It rolled out to pad 39A on April 26, 1995. STS-71 was exposed on the pad for 63 days and launched on June 27, 1995, at 19:32 UTC.

### 5.69.1 STS-71 Pad Exposure Period Data Archive Sources

Temperature, relative humidity, wind speed and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-71 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.69.2 STS-71 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-71 are shown in table 141. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 141. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 141. STS-71 L-0 surface observations.

Temperature	29.6 °C (85.2 °F)
Relative humidity	83%
Sea level pressure	1,016 hPa (30 inHg)
Wind speed	4 m/s (7.7 kt) (1-min average)
Wind direction	89° (1-min average)
Sky condition	3/8 cumulus at 1,260 m (4,134 ft); 1/8 cirrus at 6,900 m (22,638 ft)
Visibility	14.5 km (7.8 nmi)

### 5.69.3 STS-71 Pad Exposure Period Hourly Meteorological Parameters

Figures 415–420 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-71 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 142. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 142. STS-71 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	27%
Maximum relative humidity	95%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,022.4 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	18.5 m/s (36 kt) 266°
Total precipitation	219.2 mm (8.63 in)

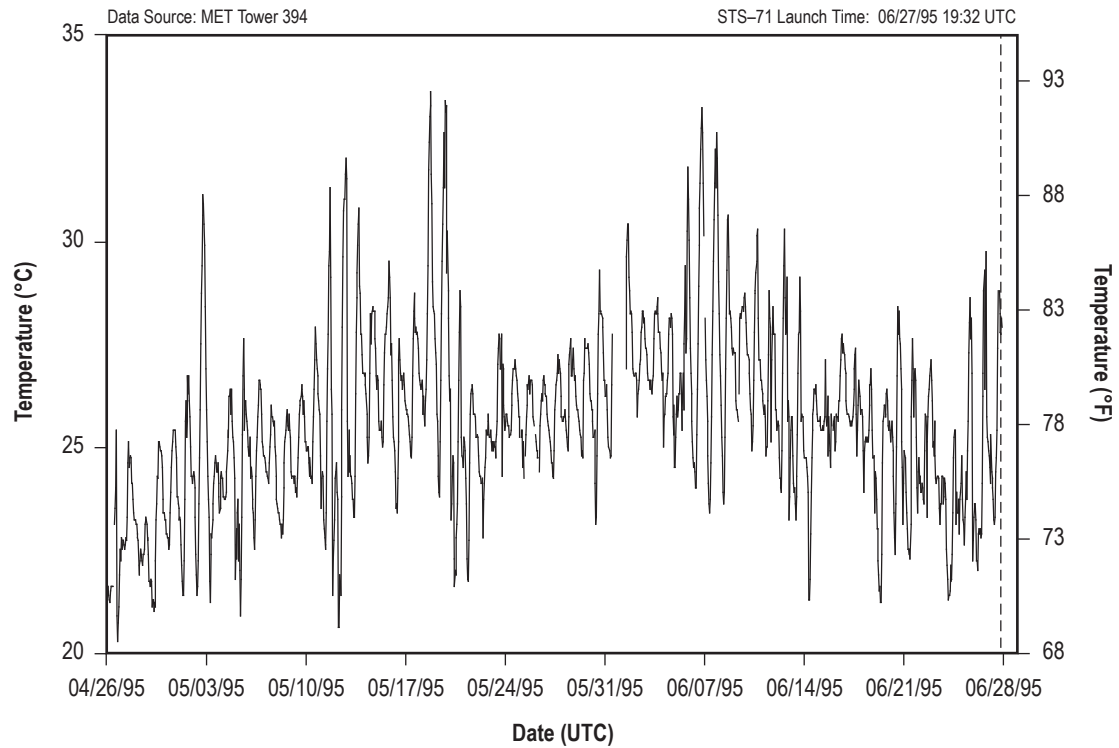


Figure 415. STS-71 hourly surface temperature.

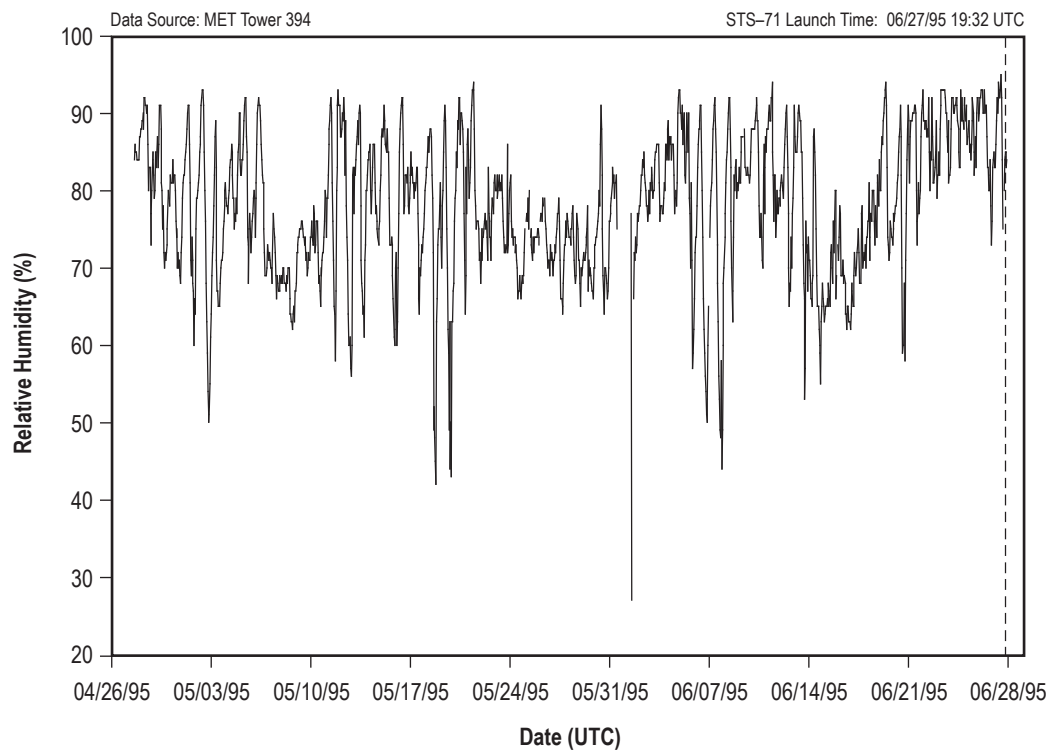


Figure 416. STS-71 hourly surface relative humidity.

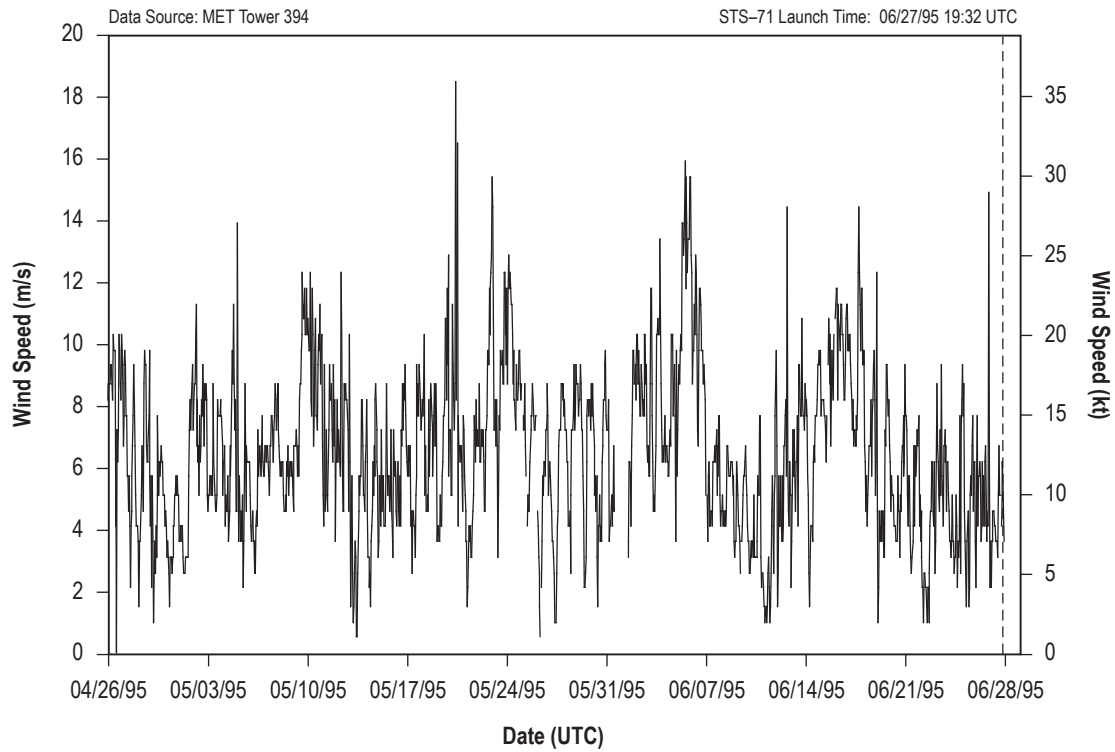


Figure 417. STS-71 hourly surface wind speed.

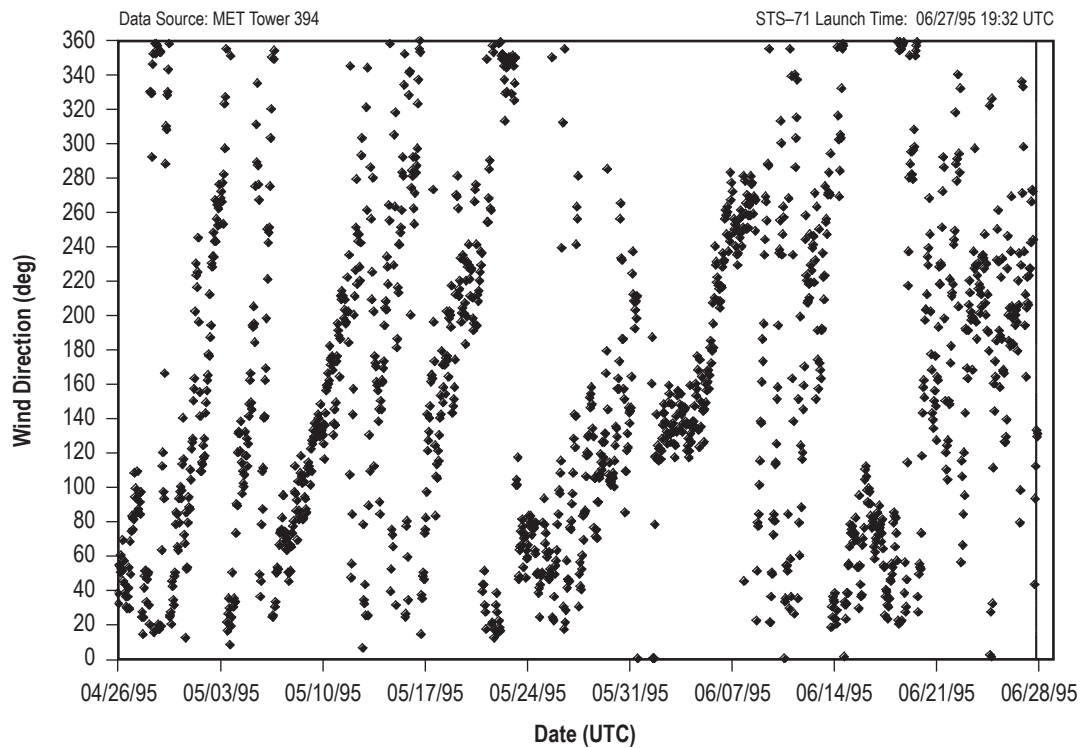


Figure 418. STS-71 hourly surface wind direction.

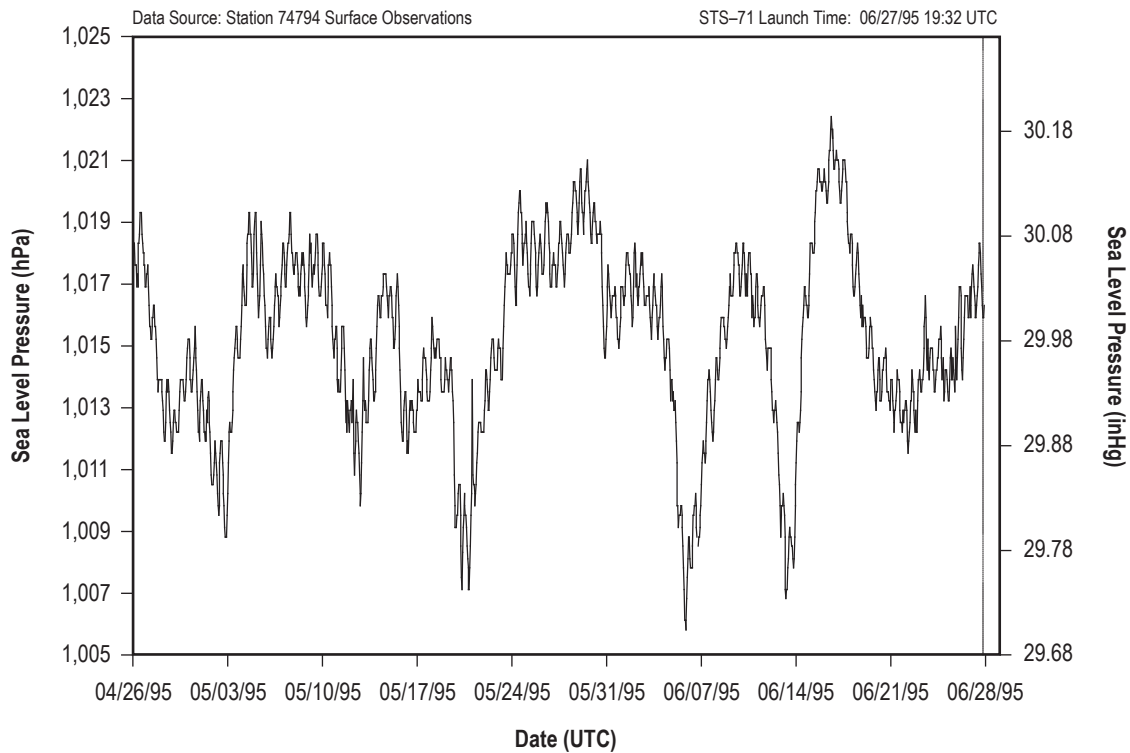


Figure 419. STS-71 hourly sea level pressure.

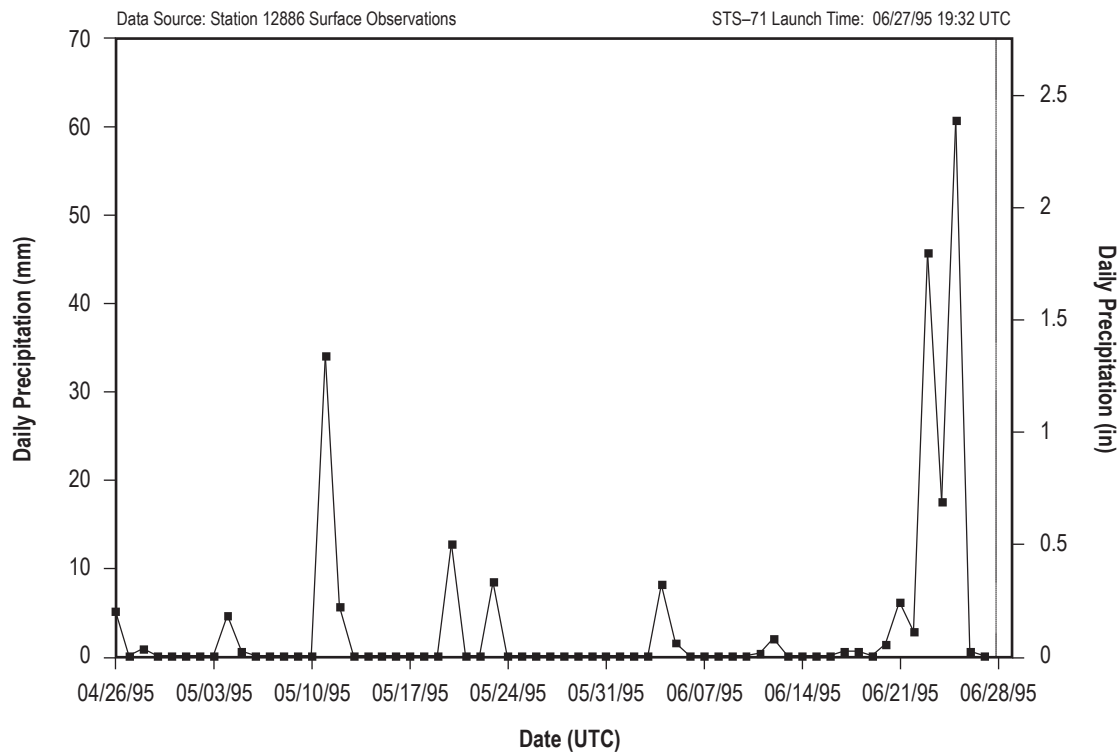


Figure 420. STS-71 daily precipitation totals.

## 5.70 STS–70

STS–70 was the 21st mission for *Discovery* (OV–103). It rolled out to pad 39B the first time on May 11, 1995. It was rolled back from the pad on June 8, 1995. STS–70 rolled out to pad 39B the second time on June 15, 1995. STS–70 was exposed on the pad for a total of 58 days (29 days after the first rollout and 29 days after the second rollout) and launched on July 13, 1995, at 13:42 UTC.

### 5.70.1 STS–70 Pad Exposure Period Data Archive Sources

Temperature, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–70 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.70.2 STS–70 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–70 are shown in table 143. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 143. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 143. STS–70 L–0 surface observations.

Temperature	28.4 °C (83.1 °F)
Relative humidity	80%
Sea level pressure	1,016.7 hPa (30.02 inHg)
Wind speed	2.7 m/s (5.2 kt) (1-min average)
Wind direction	51° (1-min average)
Sky condition	3/8 cumulus at 570 m (1,870 ft); 7/8 cirrostratus at 6,700 m (21,981 ft)
Visibility	16.1 km (8.7 nmi)

### 5.70.3 STS–70 Pad Exposure Period Hourly Meteorological Parameters

Figures 421–426 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–70 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 144. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 144. STS–70 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	44%
Maximum relative humidity	99%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,022.4 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	19 m/s (37 kt) 267°
Total precipitation	294.6 mm (11.6 in)

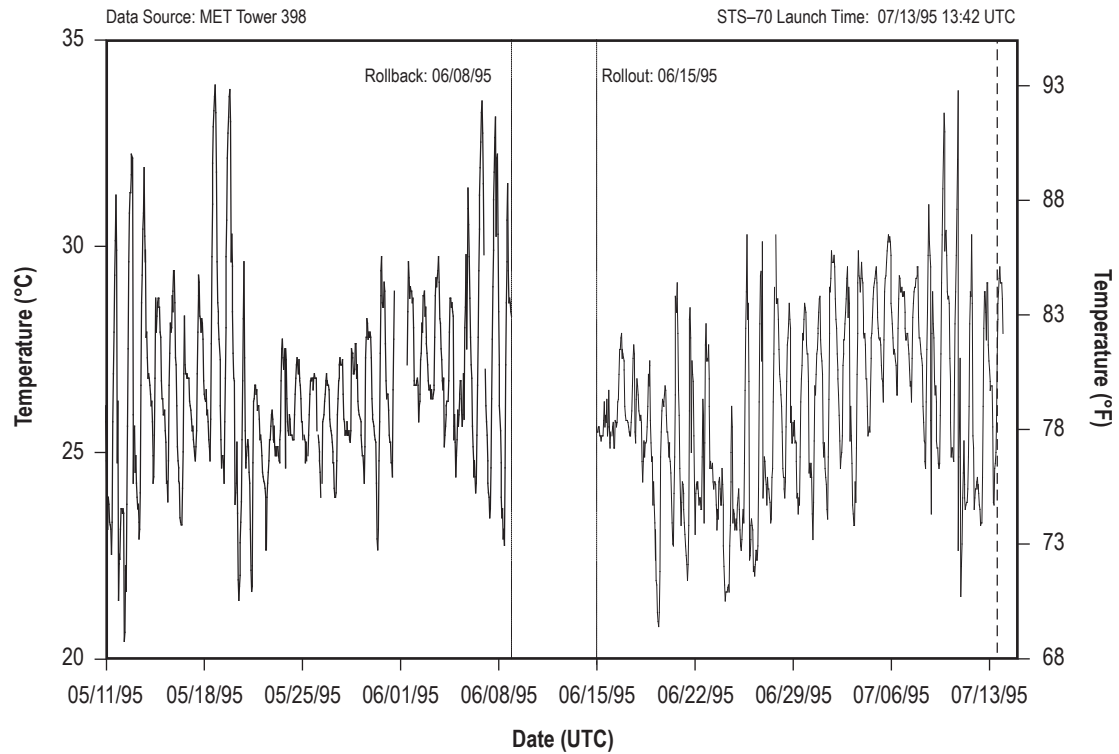


Figure 421. STS-70 hourly surface temperature.

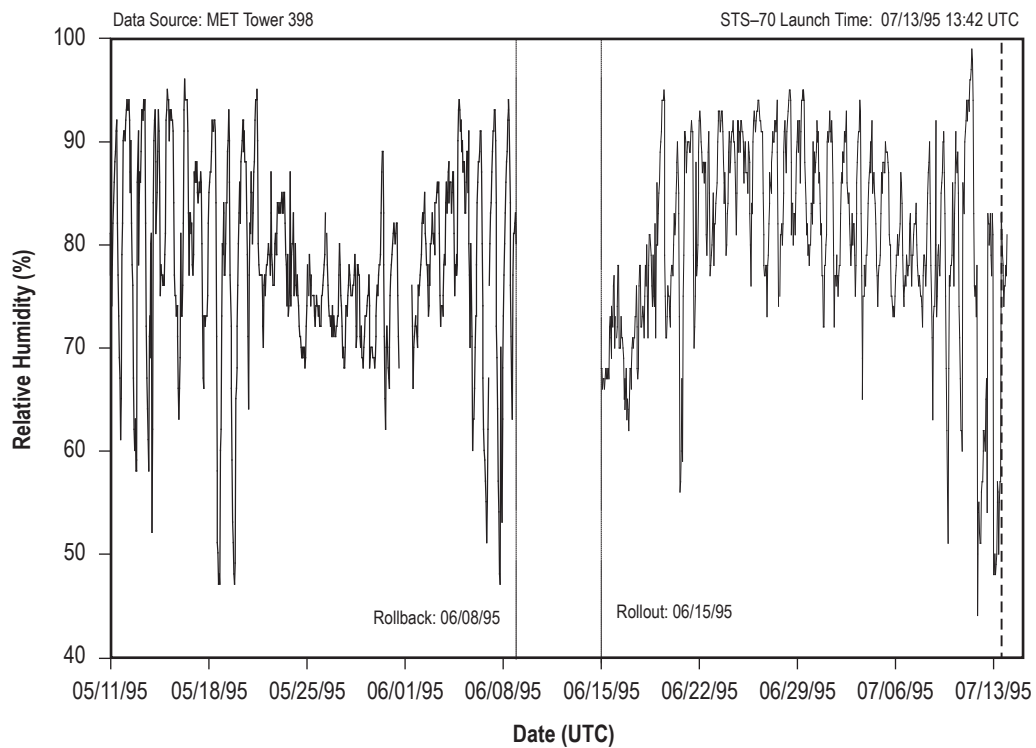


Figure 422. STS-70 hourly surface relative humidity.

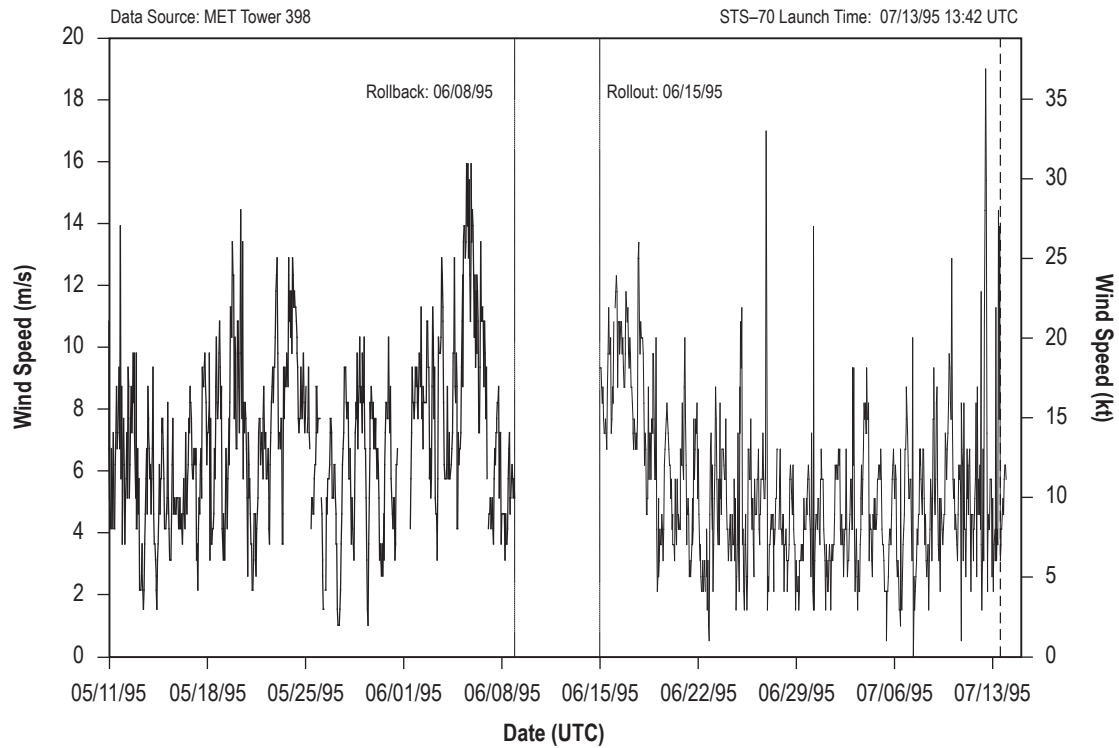


Figure 423. STS-70 hourly surface wind speed.

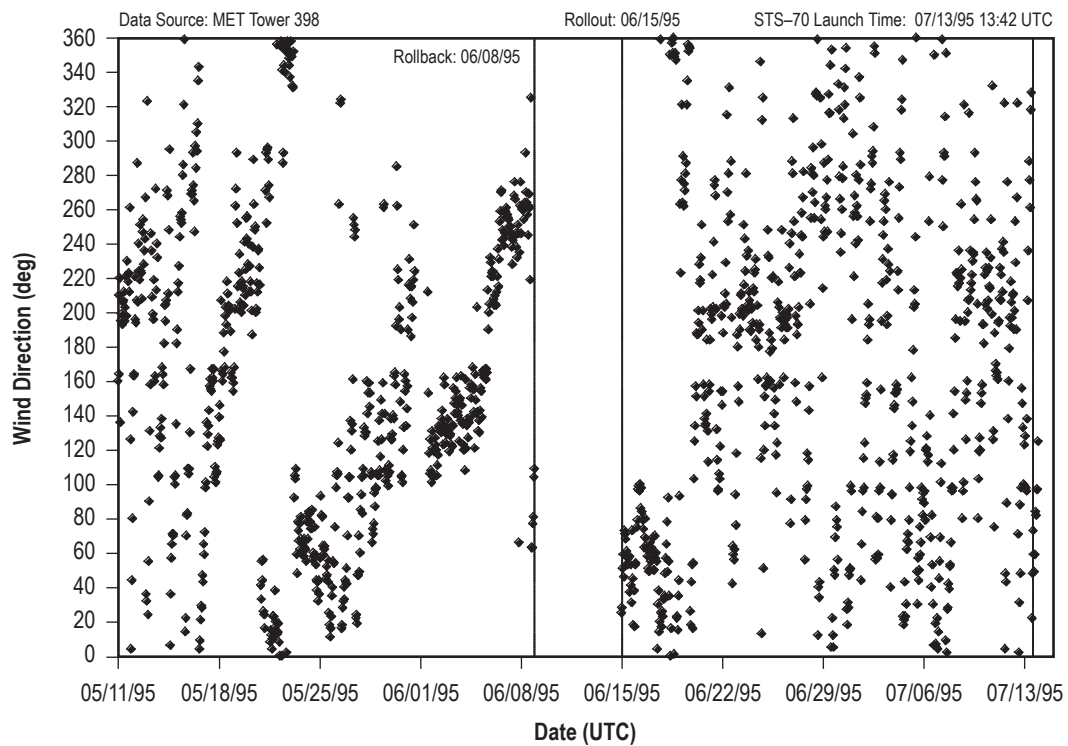


Figure 424. STS-70 hourly surface wind direction.



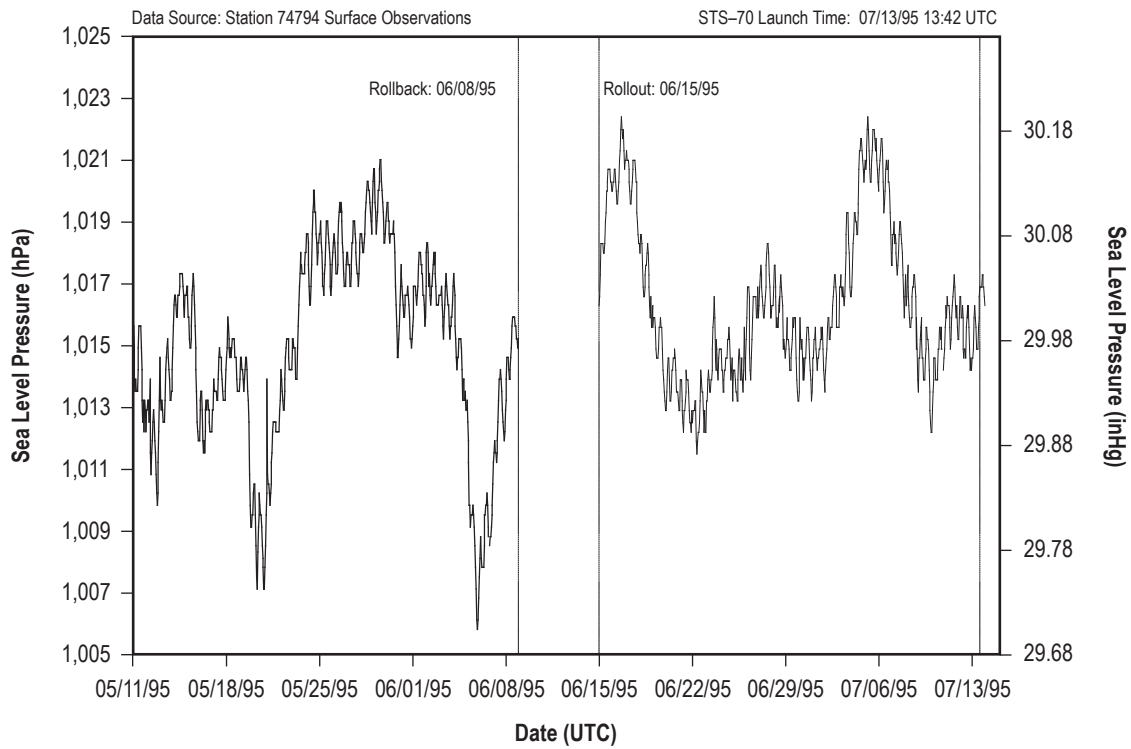


Figure 425. STS-70 hourly sea level pressure.

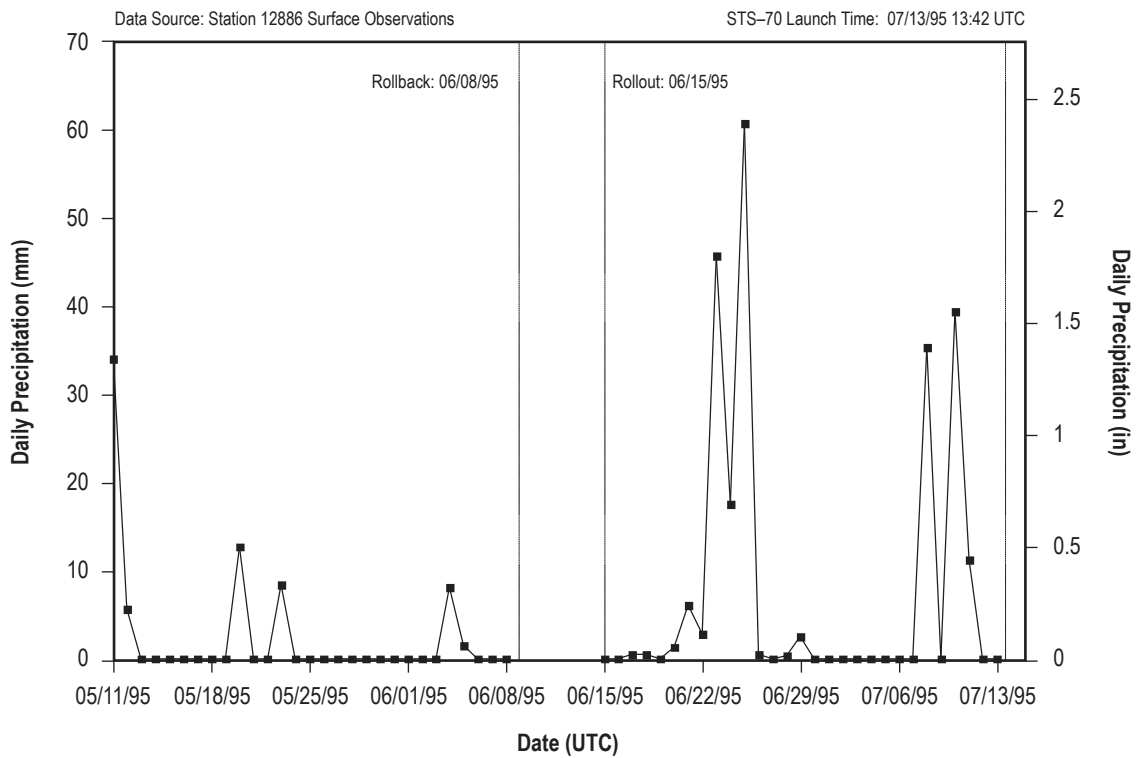


Figure 426. STS-70 daily precipitation totals.

## 5.71 STS–69

STS–69 was the ninth mission for *Endeavour* (OV–105). It rolled out to pad 39A the first time on July 5, 1995. It was rolled back from the pad on August 1, 1995. STS–69 rolled out to pad 39A the second time on August 8, 1995. STS–69 was exposed on the pad for a total of 59 days (28 days after the first rollout and 31 days after the second rollout) and launched on September 7, 1995, at 15:09 UTC.

### 5.71.1 STS–69 Pad Exposure Period Data Archive Sources

Temperature, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–69 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.71.2 STS–69 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–69 are shown in table 145. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 145. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 145. STS–69 L–0 surface observations.

Temperature	28.9 °C (84 °F)
Relative humidity	77%
Sea level pressure	1,011.9 hPa (29.88 inHg)
Wind speed	3.3 m/s (6.5 kt) (1-min average)
Wind direction	160° (1-min average)
Sky condition	1/8 cumulus at 390 m (1,280 ft); 1/8 cumulonimbus at 450 m (1,476 ft); 2/8 altocumulus at 4,800 m (15,748 ft); 8/8 cirrostratus at 6,900 m (22,638 ft)
Visibility	12.9 km (6.9 nmi)

### 5.71.3 STS–69 Pad Exposure Period Hourly Meteorological Parameters

Figures 427–432 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–69 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 146. Temperature, relative humidity, wind speed, wind direction, and pressure data in this section are from station 74794. Precipitation was measured at station 12886. The data from the MET towers were not used in this section because several days, including the final 2 days of the countdown, are missing.

Table 146. STS–69 pad exposure period hourly extremes.

Minimum temperature	21.7 °C (71 °F)
Maximum temperature	35 °C (95 °F)
Minimum relative humidity	40%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.1 hPa (29.71 inHg)
Maximum sea level pressure	1,022.4 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	9.8 m/s (19 kt) 130°
Total precipitation	539.8 mm (21.25 in)

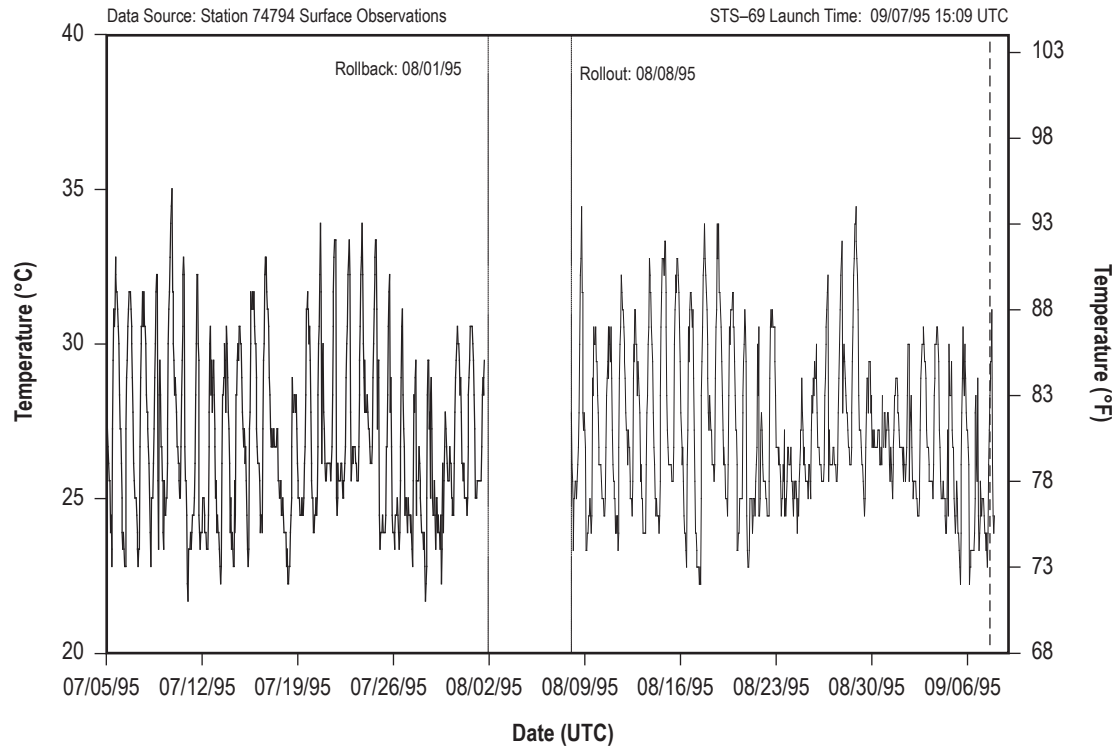


Figure 427. STS-69 hourly surface temperature.

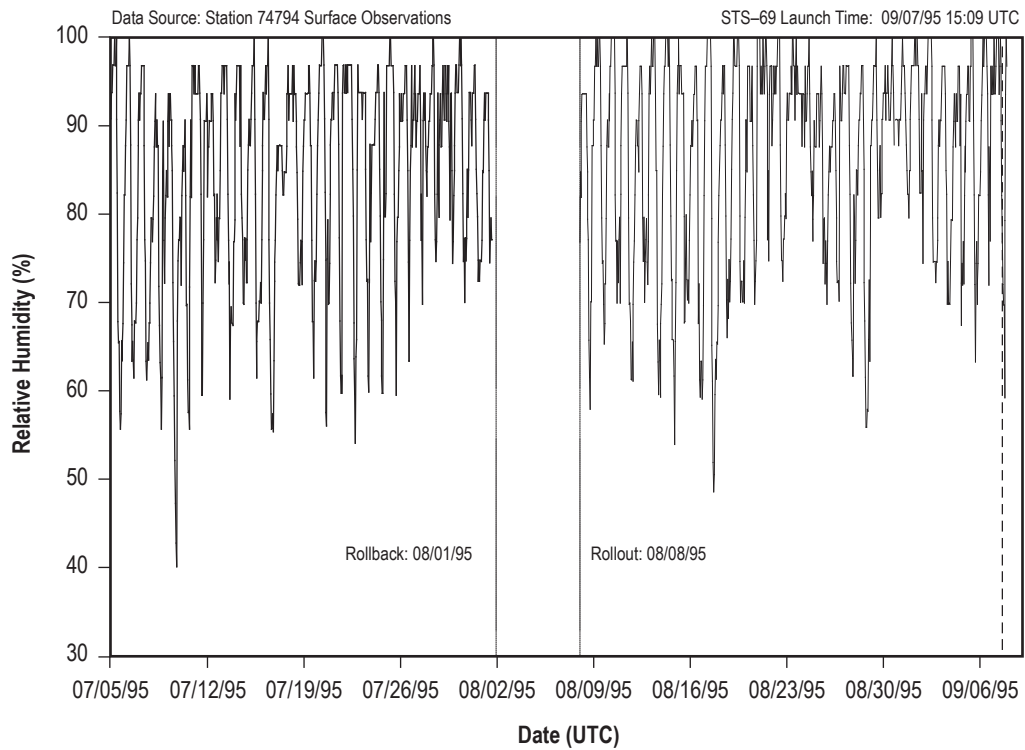


Figure 428. STS-69 hourly surface relative humidity.

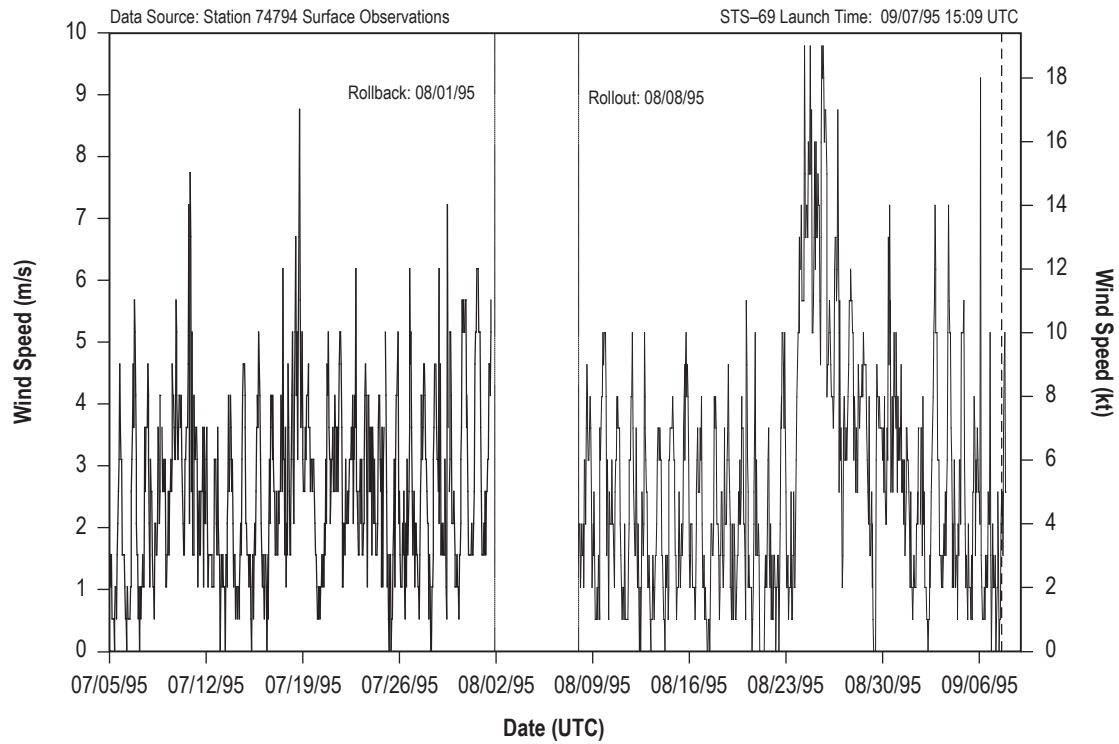


Figure 429. STS-69 hourly surface wind speed.

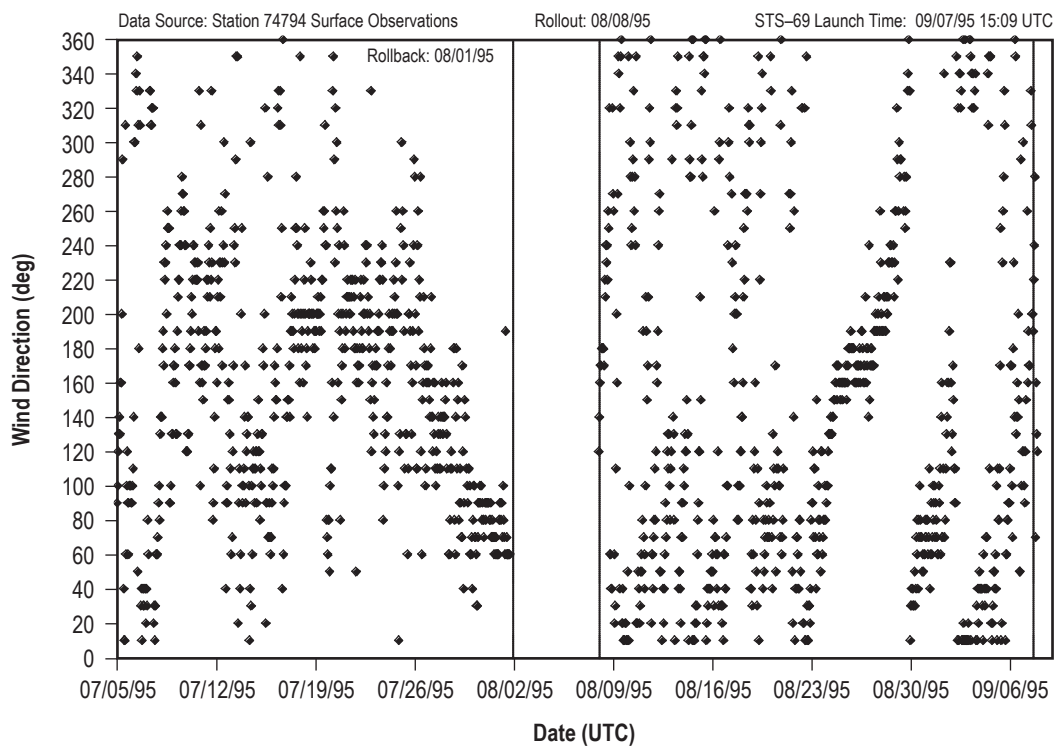


Figure 430. STS-69 hourly surface wind direction.

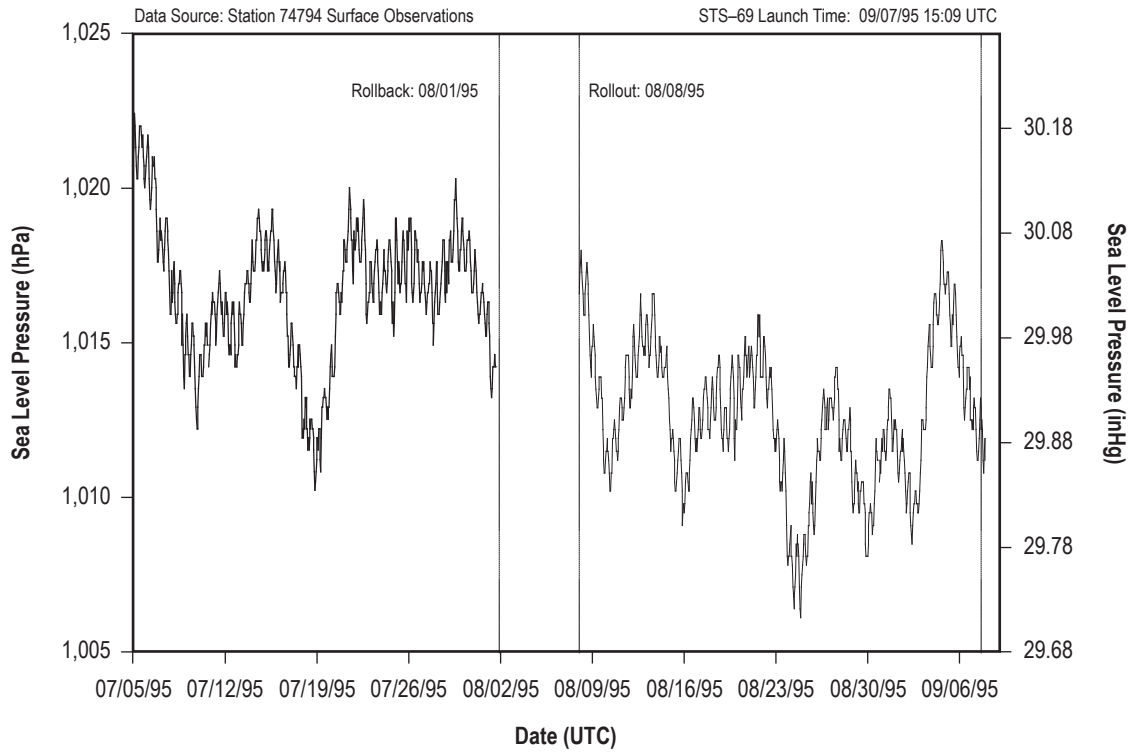


Figure 431. STS-69 hourly sea level pressure.

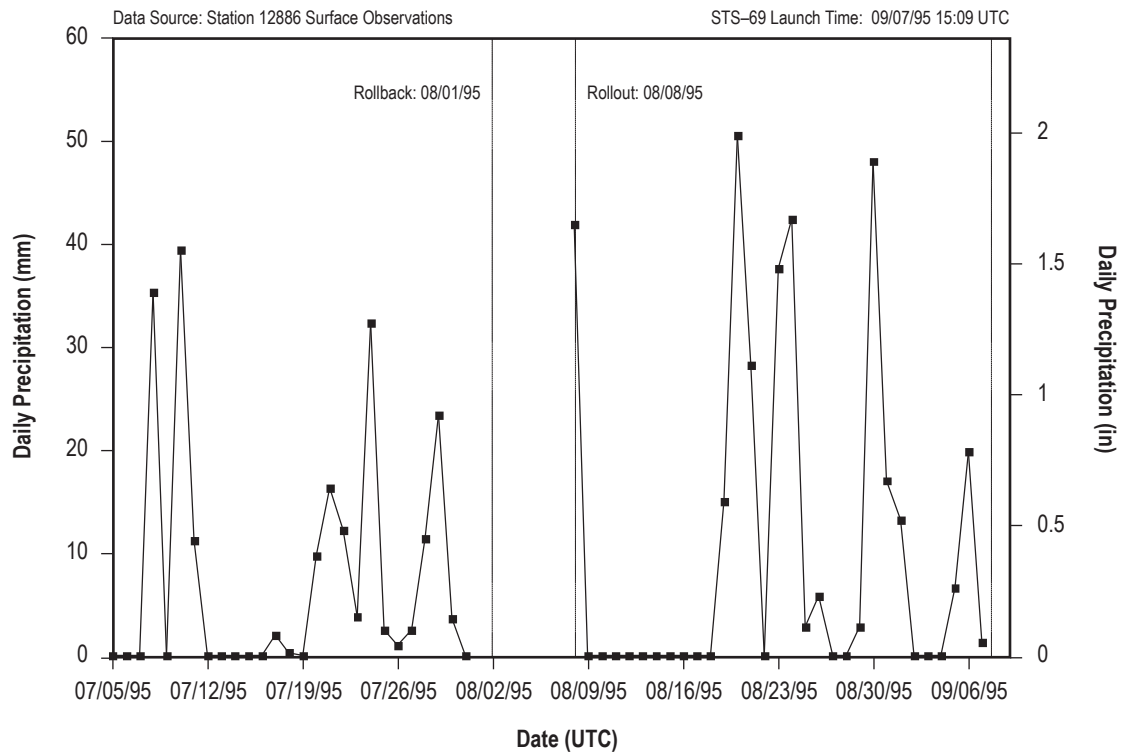


Figure 432. STS-69 daily precipitation totals.

## 5.72 STS-73

STS-73 was the 18th mission for *Columbia* (OV-102). It rolled out to pad 39B on August 28, 1995. STS-73 was exposed on the pad for 54 days and launched on October 20, 1995, at 13:53 UTC.

### 5.72.1 STS-73 Pad Exposure Period Data Archive Sources

Temperature, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-73 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.72.2 STS-73 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-73 are shown in table 147. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 147. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 147. STS-73 L-0 surface observations.

Temperature	25.1 °C (77.2 °F)
Relative humidity	99%
Sea level pressure	1,012.6 hPa (29.9 inHg)
Wind speed	2.8 m/s (5.5 kt) (1-min average)
Wind direction	297° (1-min average)
Sky condition	1/8 cumulus at 510 m (1,673 ft); 2/8 stratocumulus at 1,500 m (4,921 ft); 2/8 altocumulus at 3,600 m (11,811 ft); 4/8 cirrocumulus at 7,200 m (23,622 ft)
Visibility	12.9 km (6.9 nmi)

### 5.72.3 STS-73 Pad Exposure Period Hourly Meteorological Parameters

Figures 433–438 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-73 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 148. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 148. STS-73 pad exposure period hourly extremes.

Minimum temperature	21.7 °C (71 °F)
Maximum temperature	33.9 °C (93 °F)
Minimum relative humidity	57%
Maximum relative humidity	100%
Minimum sea level pressure	1,004.7 hPa (29.67 inHg)
Maximum sea level pressure	1,020.7 hPa (30.14 inHg)
Maximum wind speed and associated wind direction	19 m/s (37 kt) 153°
Total precipitation	398.8 mm (15.7 in)

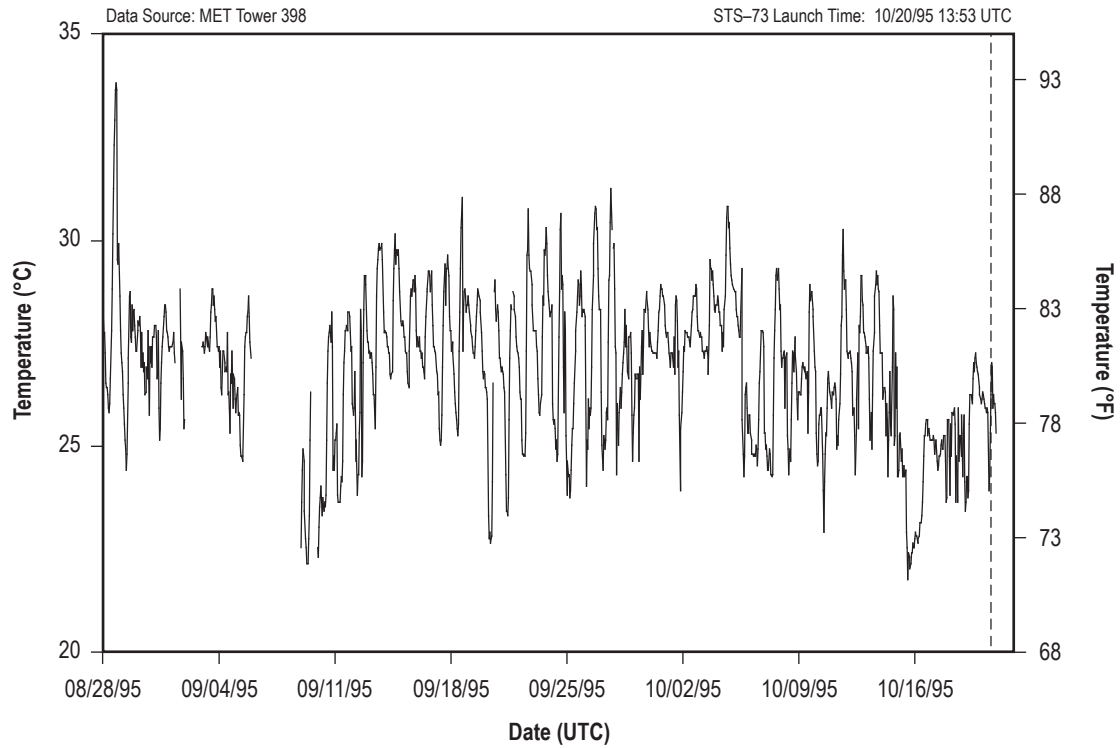


Figure 433. STS-73 hourly surface temperature.

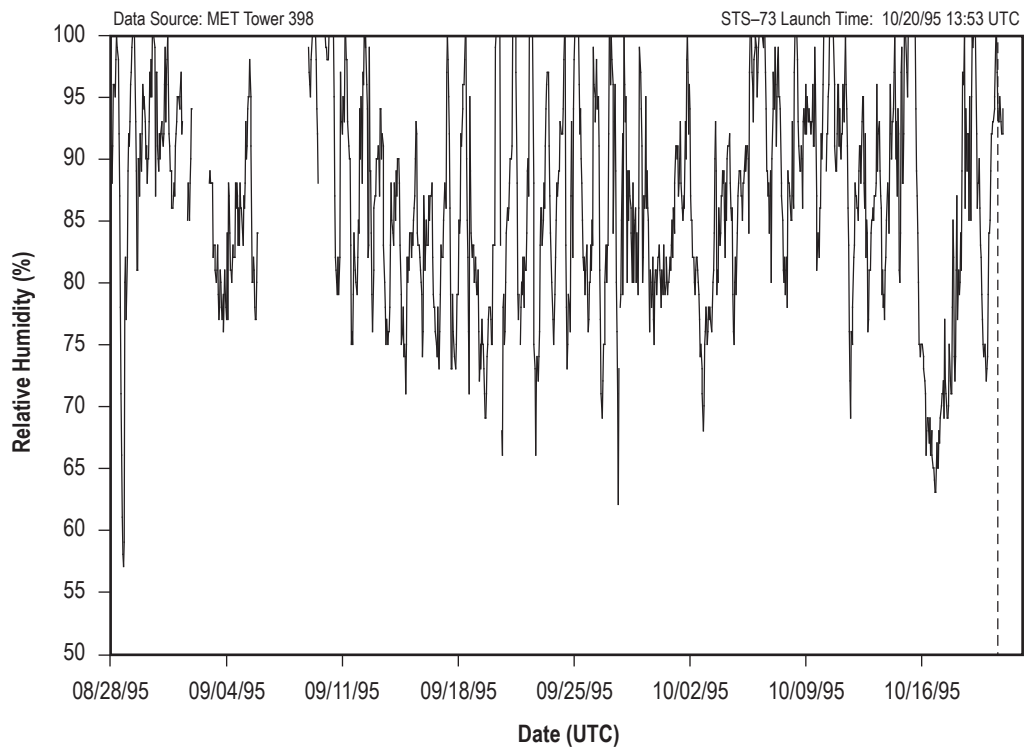


Figure 434. STS-73 hourly surface relative humidity.

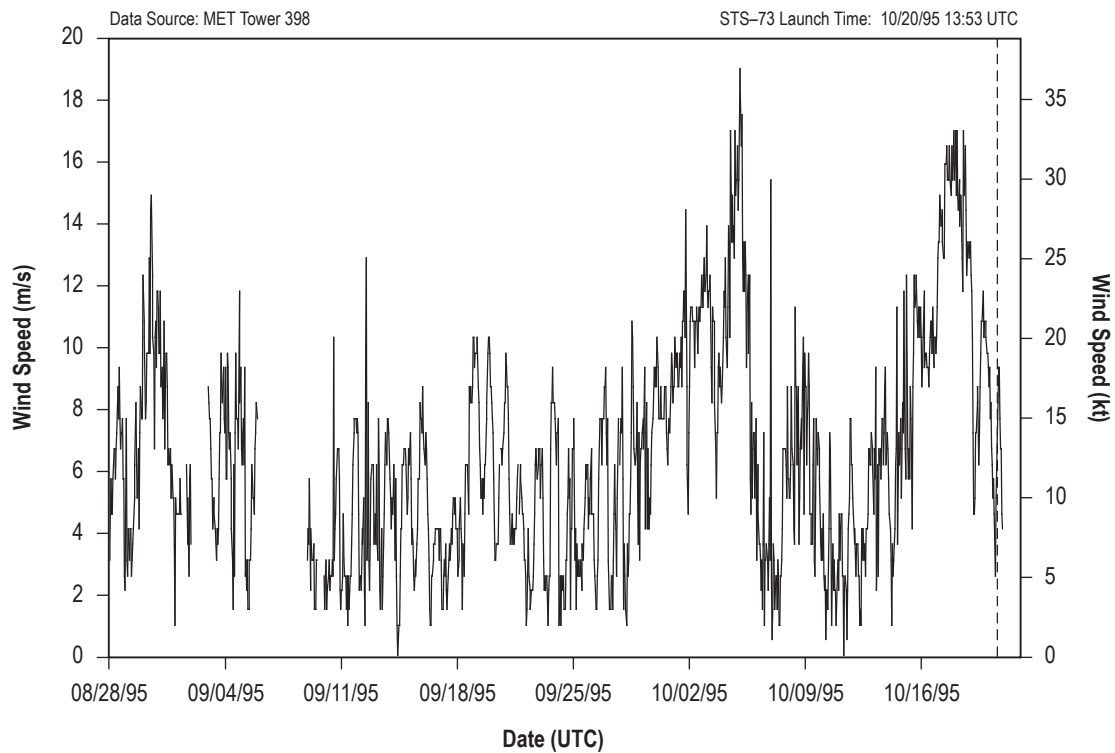


Figure 435. STS-73 hourly surface wind speed.

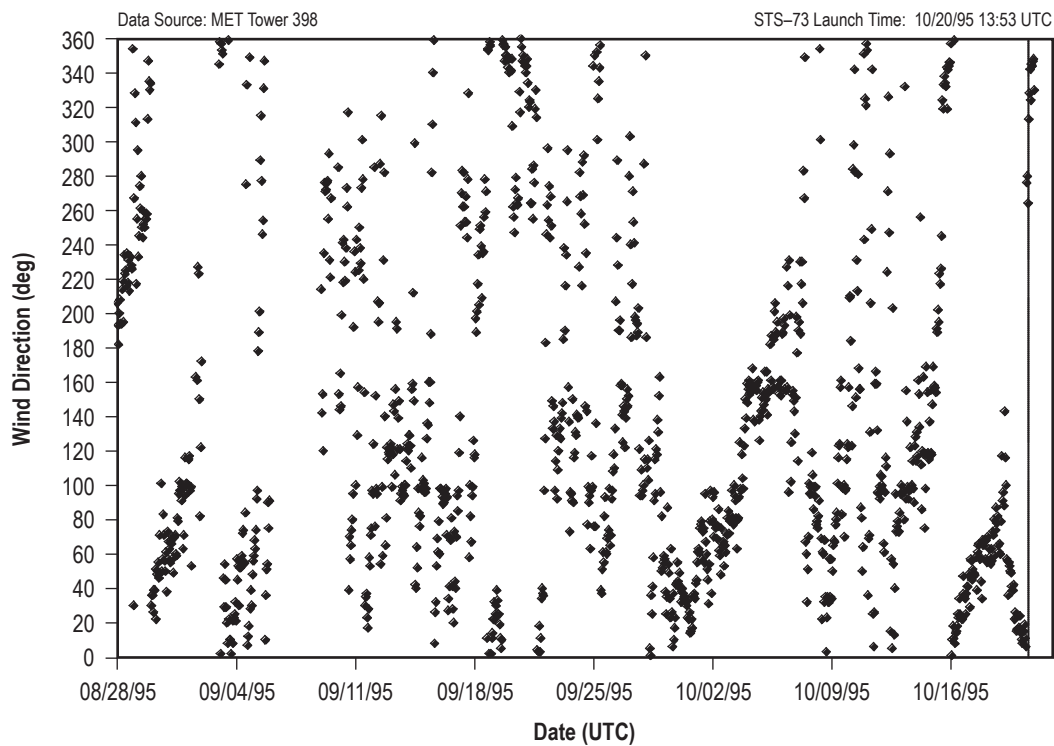


Figure 436. STS-73 hourly surface wind direction.



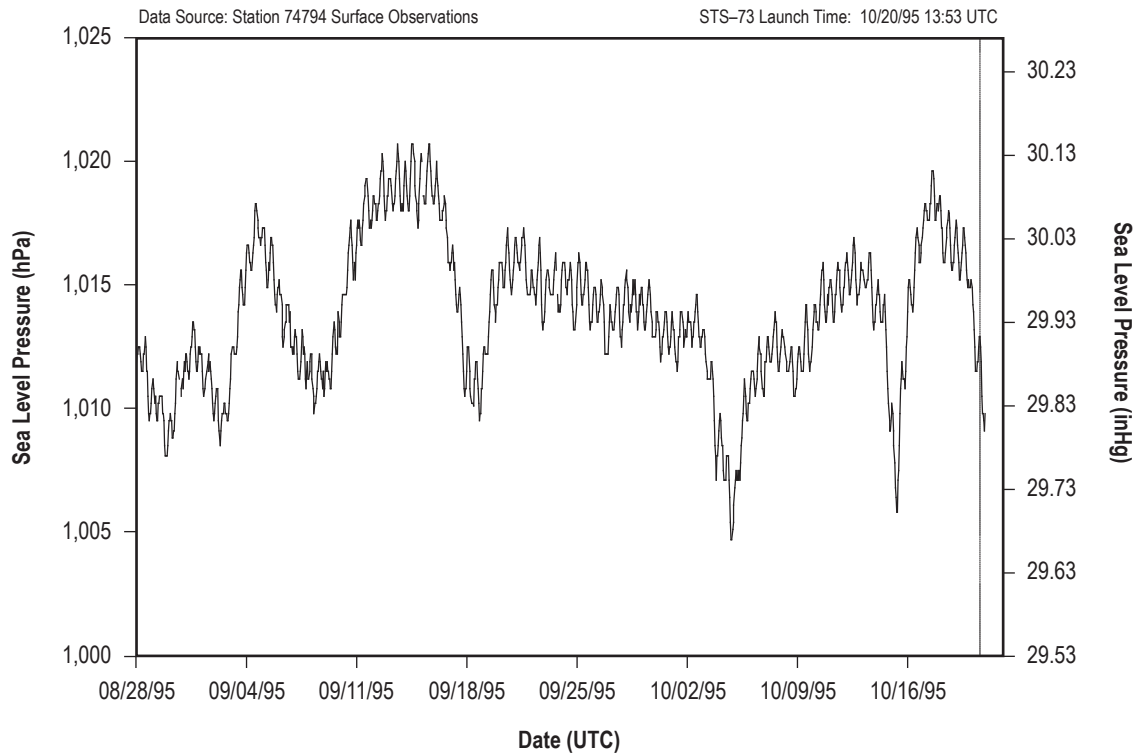


Figure 437. STS-73 hourly sea level pressure.

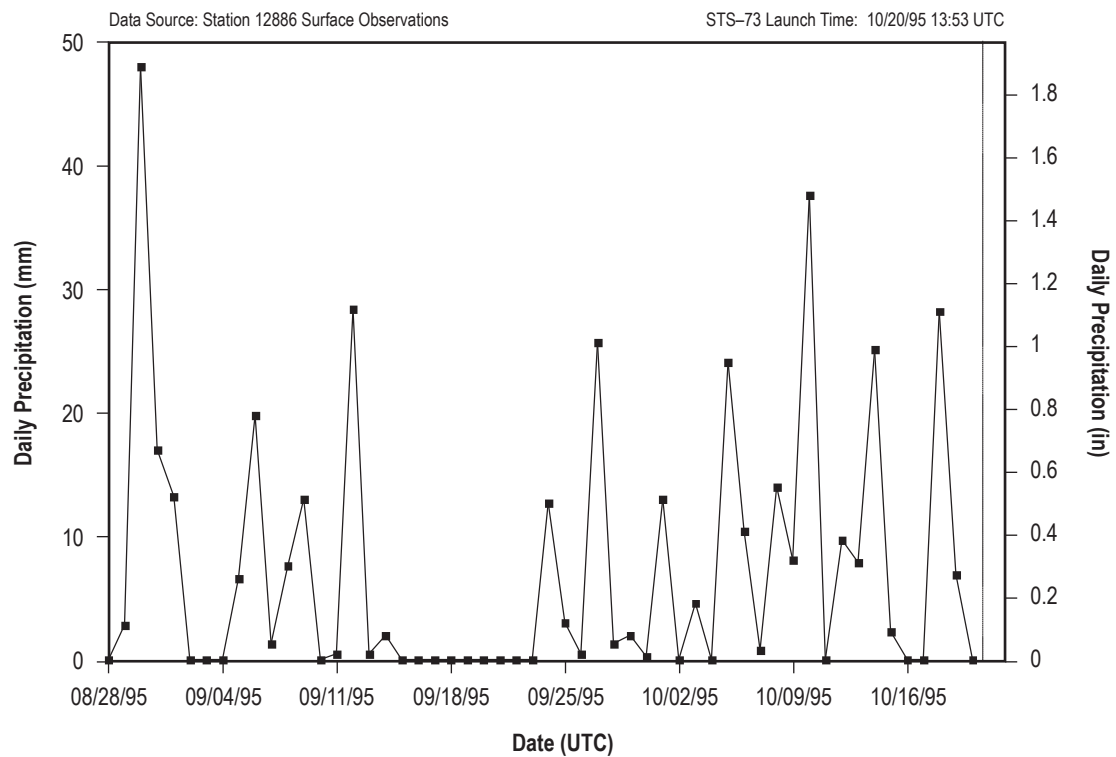


Figure 438. STS-73 daily precipitation totals.

## 5.73 STS-74

STS-74 was the 15th mission for *Atlantis* (OV-104). It rolled out to pad 39A on October 12, 1995. STS-74 was exposed on the pad for 32 days and launched on November 12, 1995, at 12:31 UTC.

### 5.73.1 STS-74 Pad Exposure Period Data Archive Sources

Temperature, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-74 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.73.2 STS-74 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-74 are shown in table 149. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 149. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 149. STS-74 L-0 surface observations.

Temperature	9.8 °C (49.7 °F)
Relative humidity	82%
Sea level pressure	1,019 hPa (30.09 inHg)
Wind speed	5 m/s (9.7 kt) (1-min average)
Wind direction	301° (1-min average)
Sky condition	1/8 stratocumulus at 450 m (1,476 ft); 1/8 stratocumulus at 1,080 m (3,543 ft)
Visibility	16.1 km (8.7 nmi)

### 5.73.3 STS-74 Pad Exposure Period Hourly Meteorological Parameters

Figures 439–444 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-74 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 150. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 150. STS-74 pad exposure period hourly extremes.

Minimum temperature	9.4 °C (49 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	32%
Maximum relative humidity	99%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,024.7 hPa (30.26 inHg)
Maximum wind speed and associated wind direction	18 m/s (35 kt) 86°
Total precipitation	102.6 mm (4.04 in)

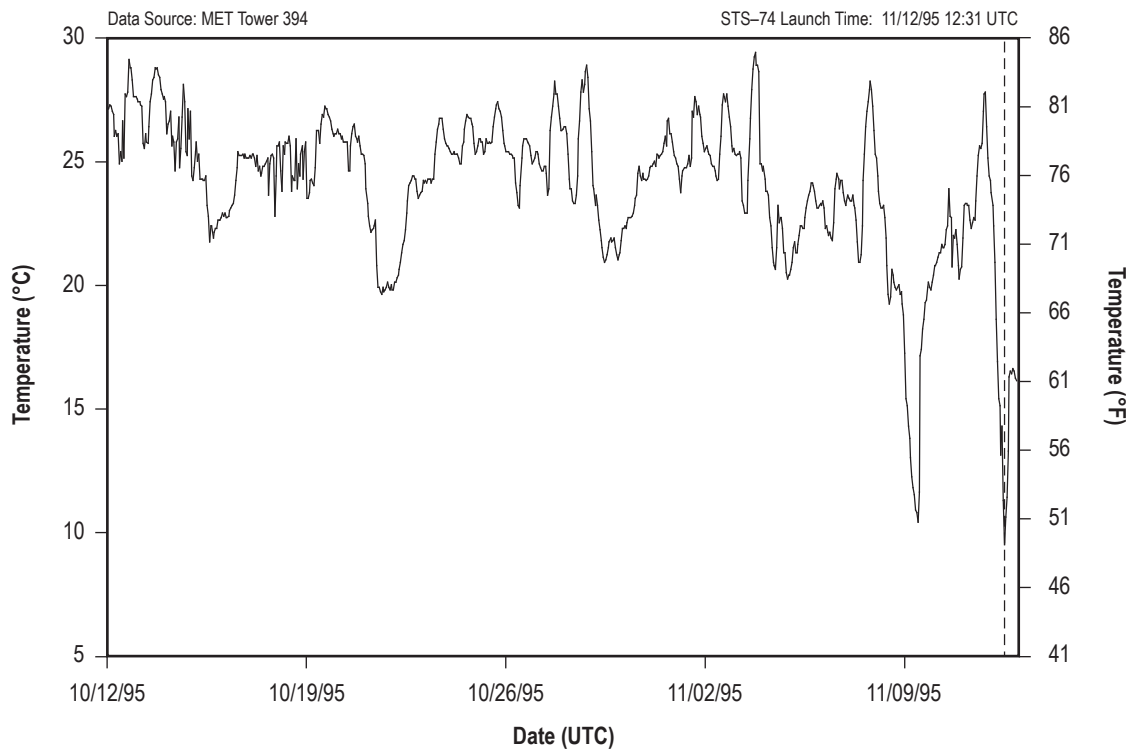


Figure 439. STS-74 hourly surface temperature.

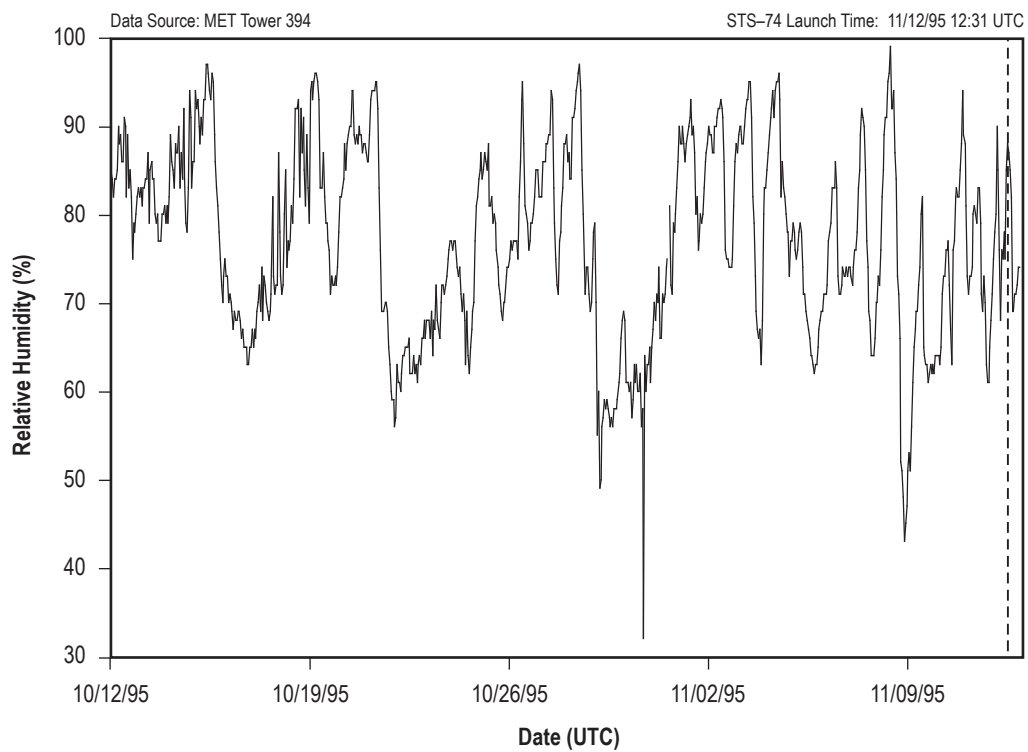


Figure 440. STS-74 hourly surface relative humidity.

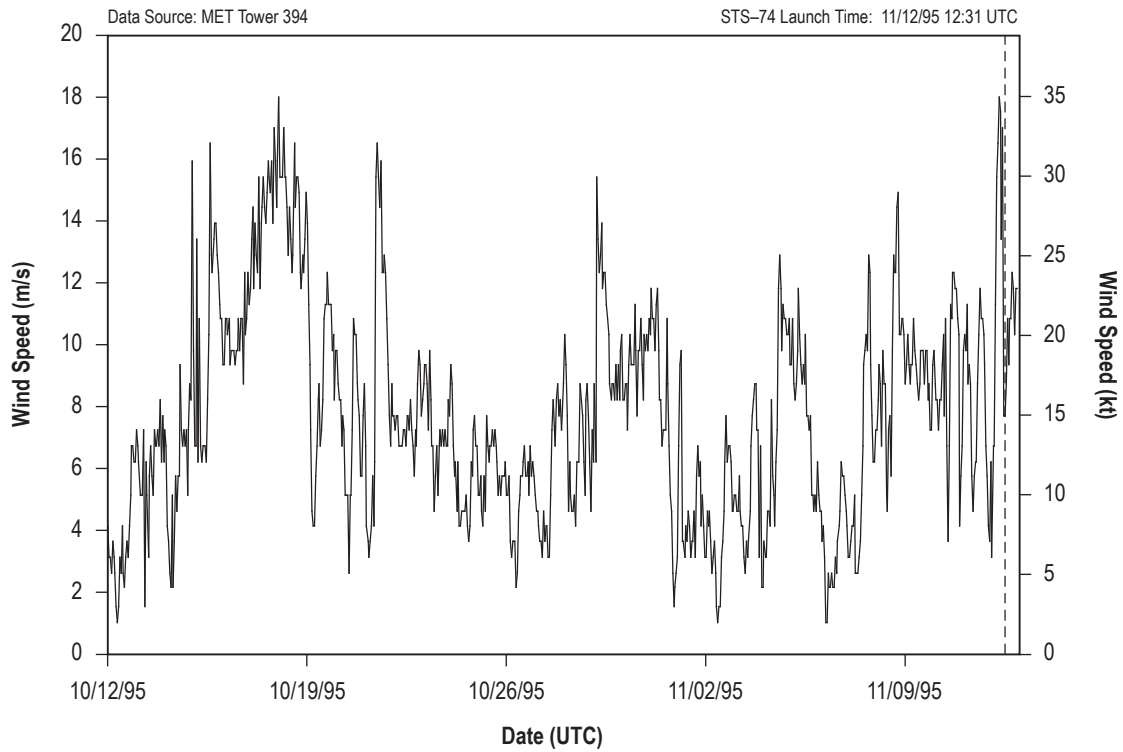


Figure 441. STS-74 hourly surface wind speed.

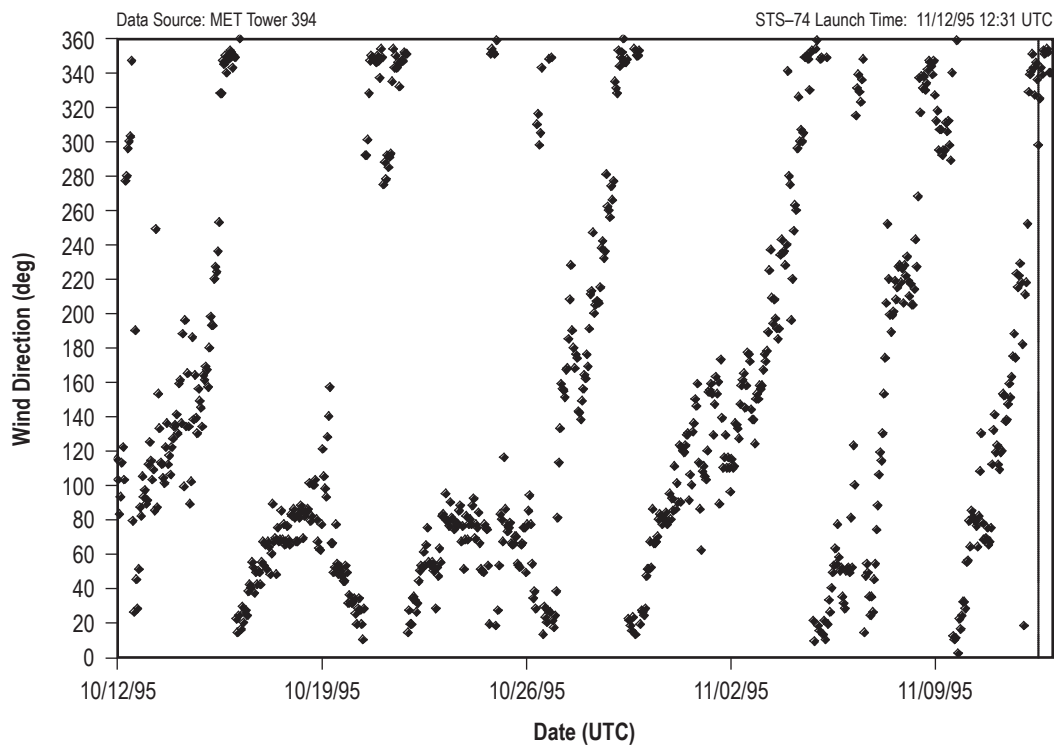


Figure 442. STS-74 hourly surface wind direction.

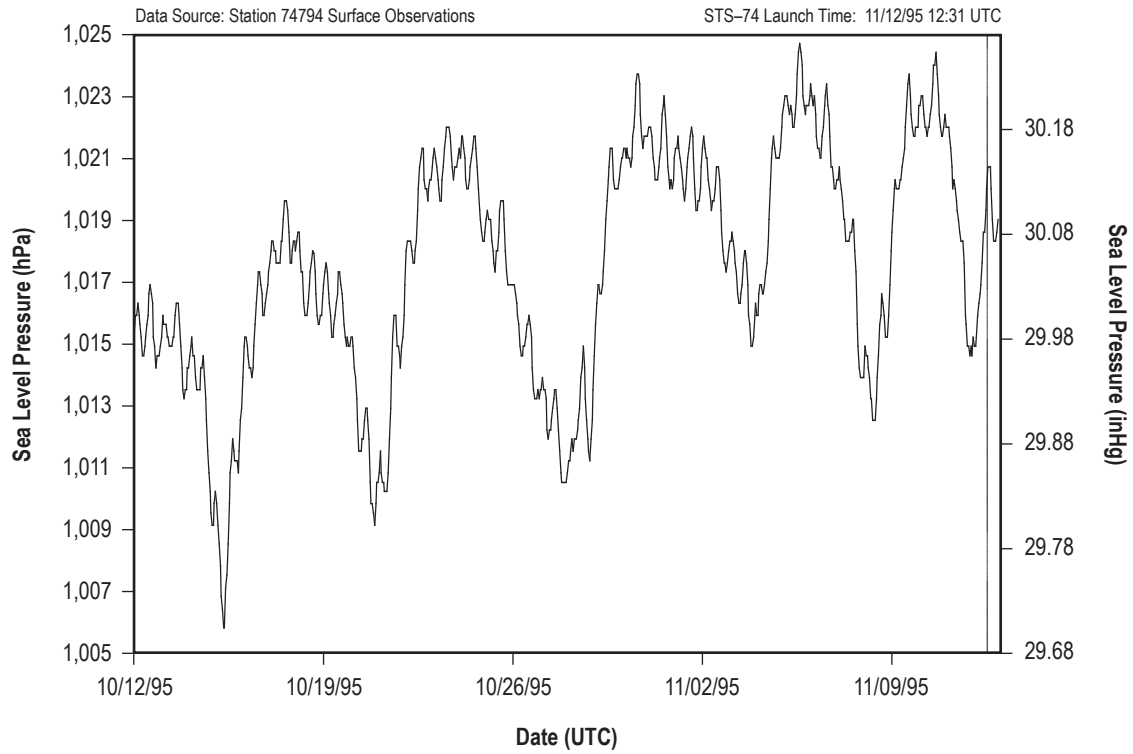


Figure 443. STS-74 hourly sea level pressure.

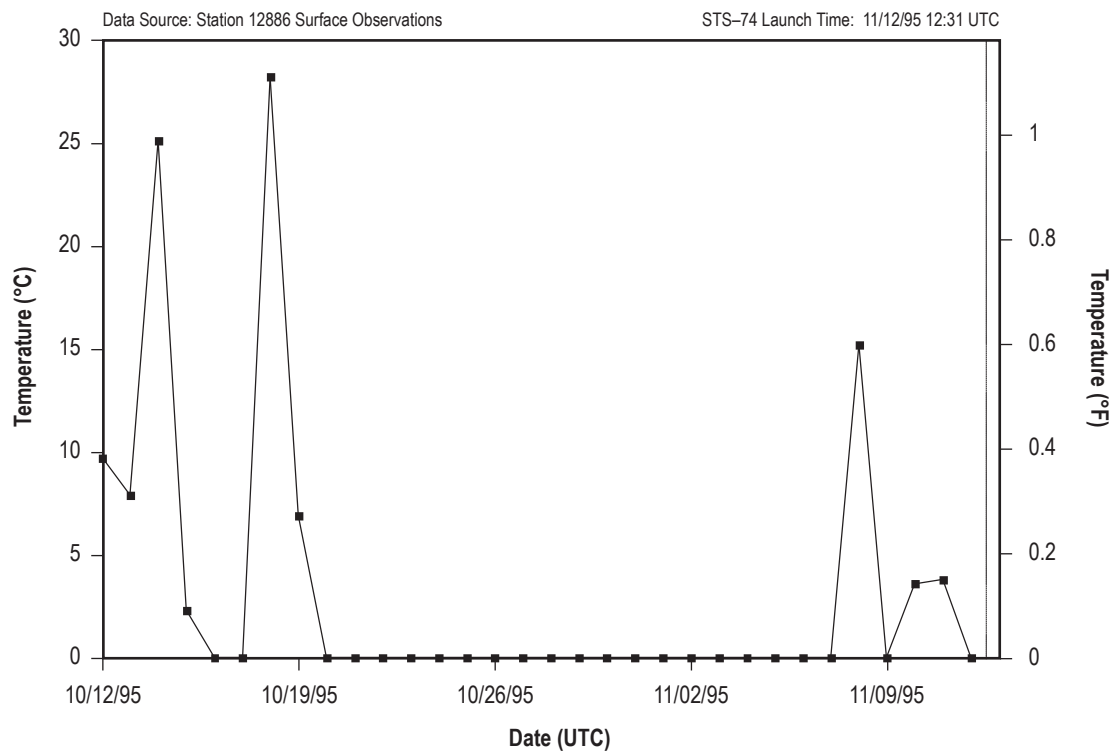


Figure 444. STS-74 daily precipitation totals.

## 5.74 STS-72

STS-72 was the 10th mission for *Endeavour* (OV-105). It rolled out to pad 39B on December 6, 1995. STS-72 was exposed on the pad for 36 days and launched on January 11, 1996, at 09:41 UTC.

### 5.74.1 STS-72 Pad Exposure Period Data Archive Sources

Temperature, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-72 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.74.2 STS-72 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-72 are shown in table 151. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 151. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 151. STS-72 L-0 surface observations.

Temperature	4.9 °C (40.8 °F)
Relative humidity	87%
Sea level pressure	1,020.1 hPa (30.12 inHg)
Wind speed	4.2 m/s (8.1 kt) (1-min average)
Wind direction	290° (1-min average)
Sky condition	7/8 cirrostratus at 7,500 m (24,606 ft)
Visibility	16.1 km (8.7 nmi)

### 5.74.3 STS-72 Pad Exposure Period Hourly Meteorological Parameters

Figures 445–450 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-72 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 152. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 152. STS-72 pad exposure period hourly extremes.

Minimum temperature	−1.1 °C (30 °F)
Maximum temperature	27.2 °C (81 °F)
Minimum relative humidity	25%
Maximum relative humidity	97%
Minimum sea level pressure	1,005.1 hPa (29.68 inHg)
Maximum sea level pressure	1,029.5 hPa (30.4 inHg)
Maximum wind speed and associated wind direction	18.5 m/s (36 kt) 261°
Total precipitation	183.4 mm (7.22 in)

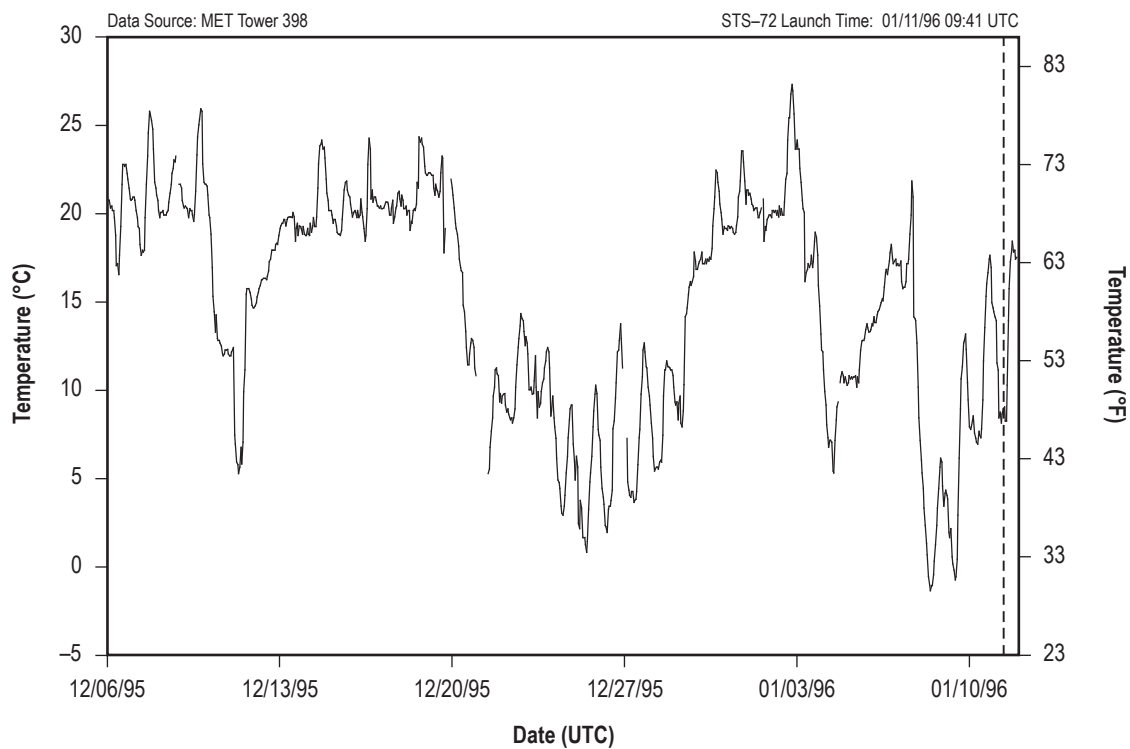


Figure 445. STS-72 hourly surface temperature.

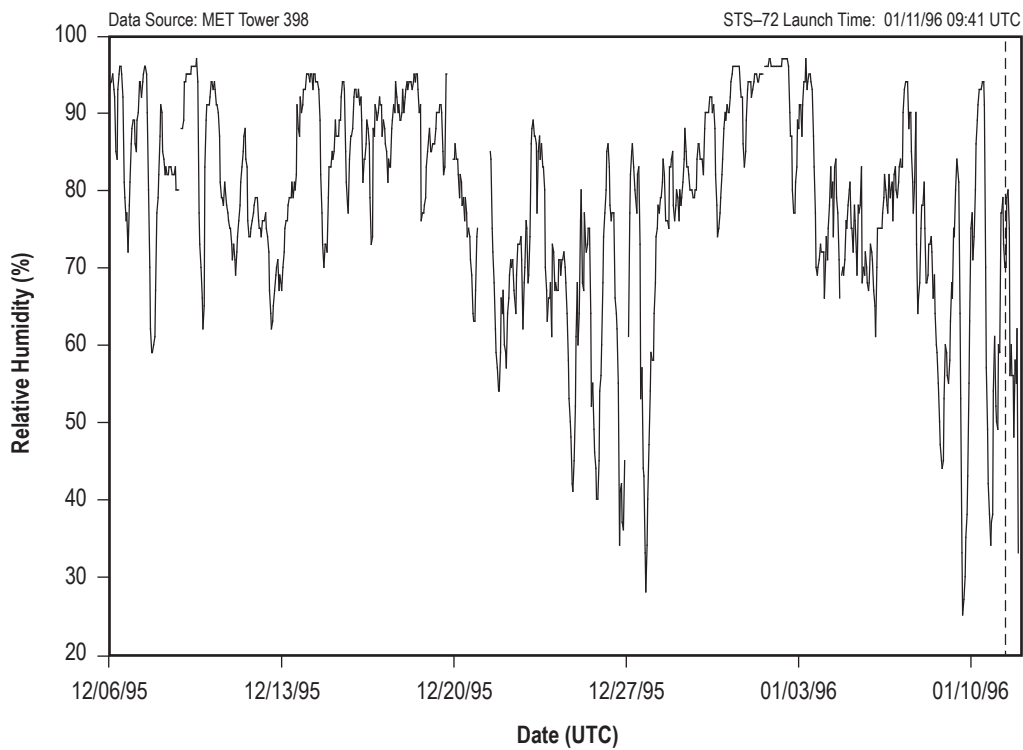


Figure 446. STS-72 hourly surface relative humidity.

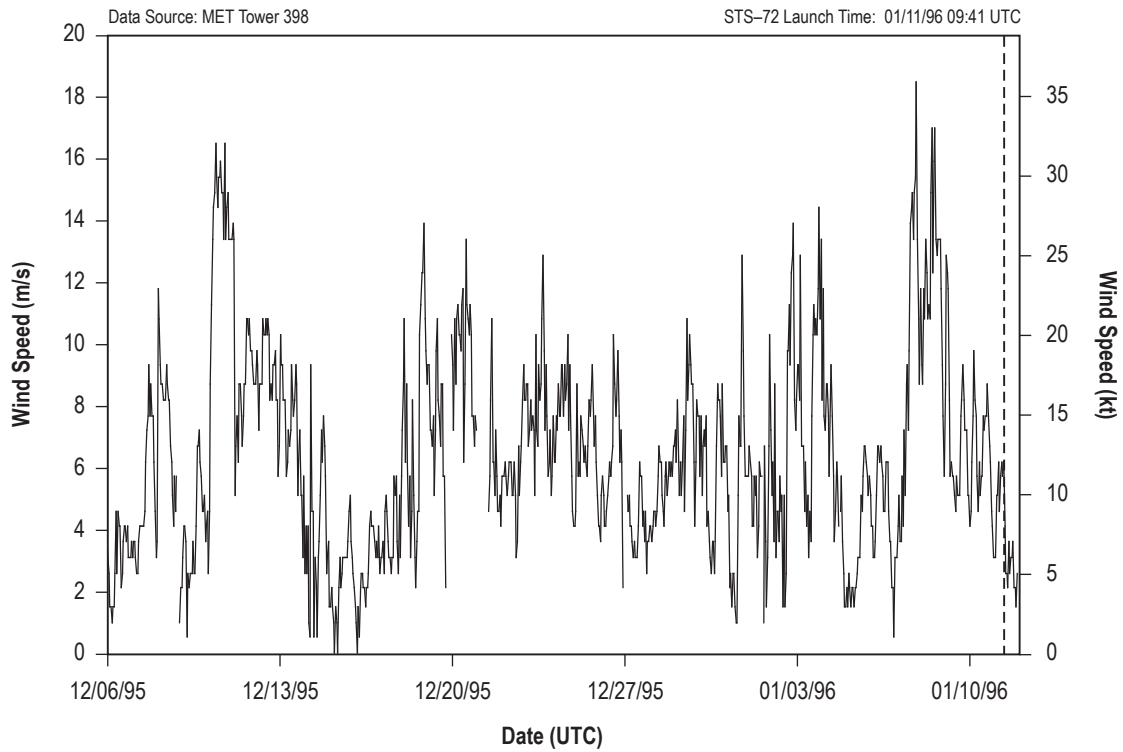


Figure 447. STS-72 hourly surface wind speed.

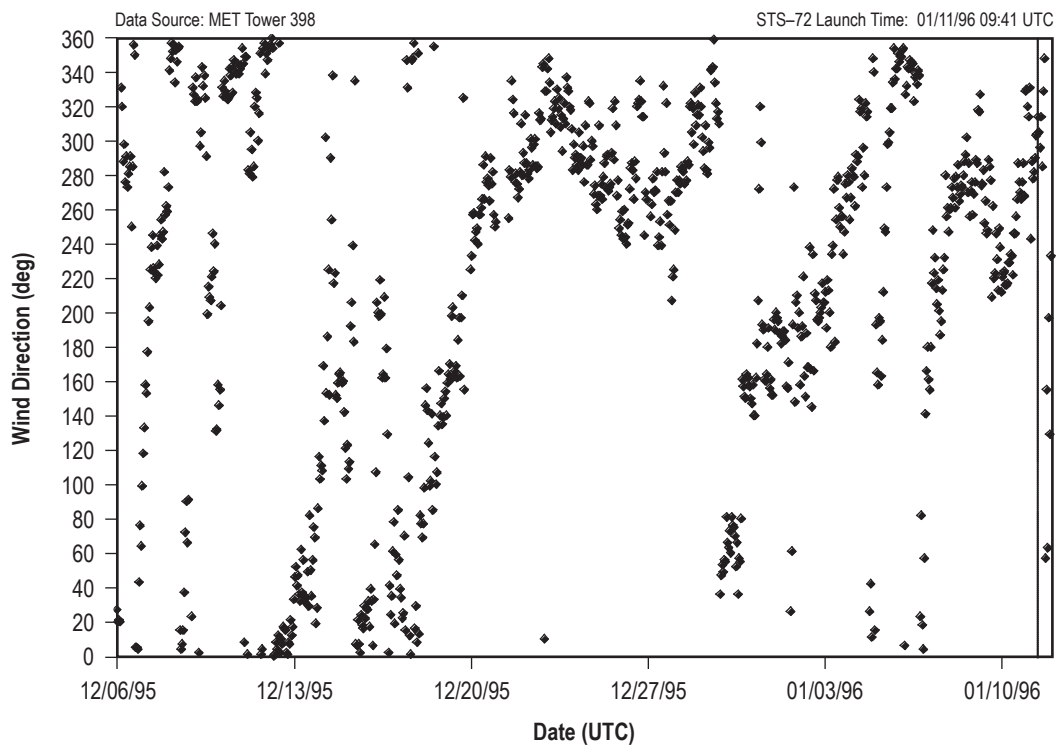


Figure 448. STS-72 hourly surface wind direction.



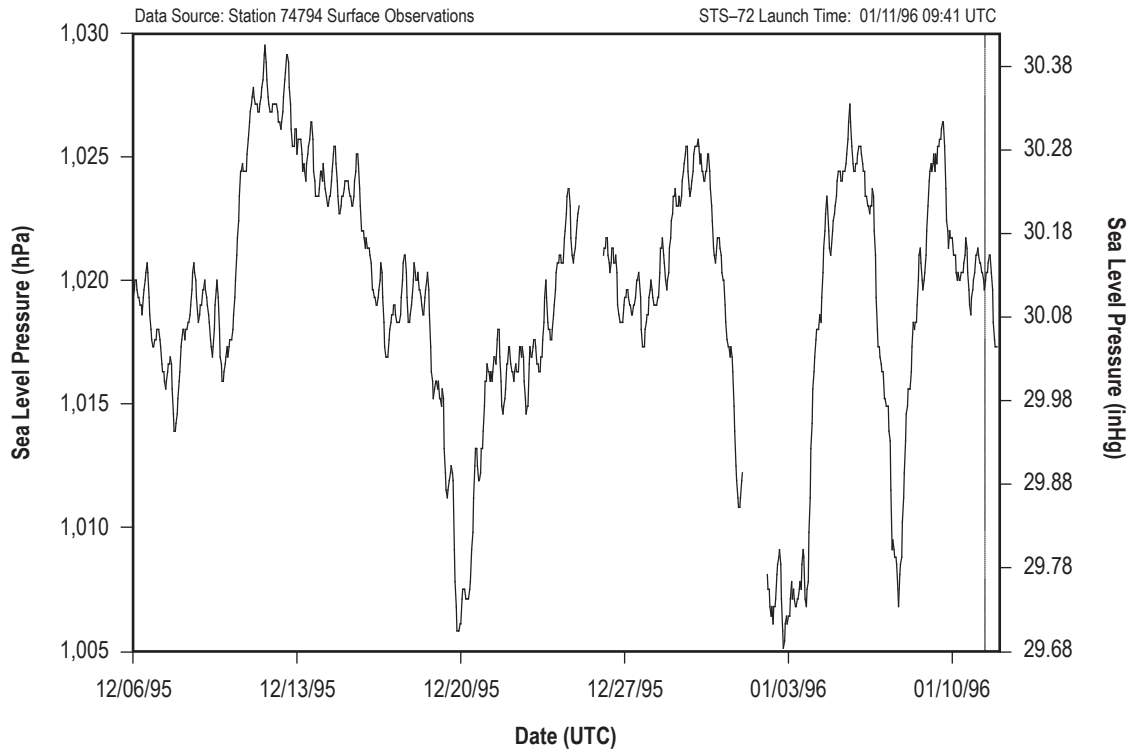


Figure 449. STS-72 hourly sea level pressure.

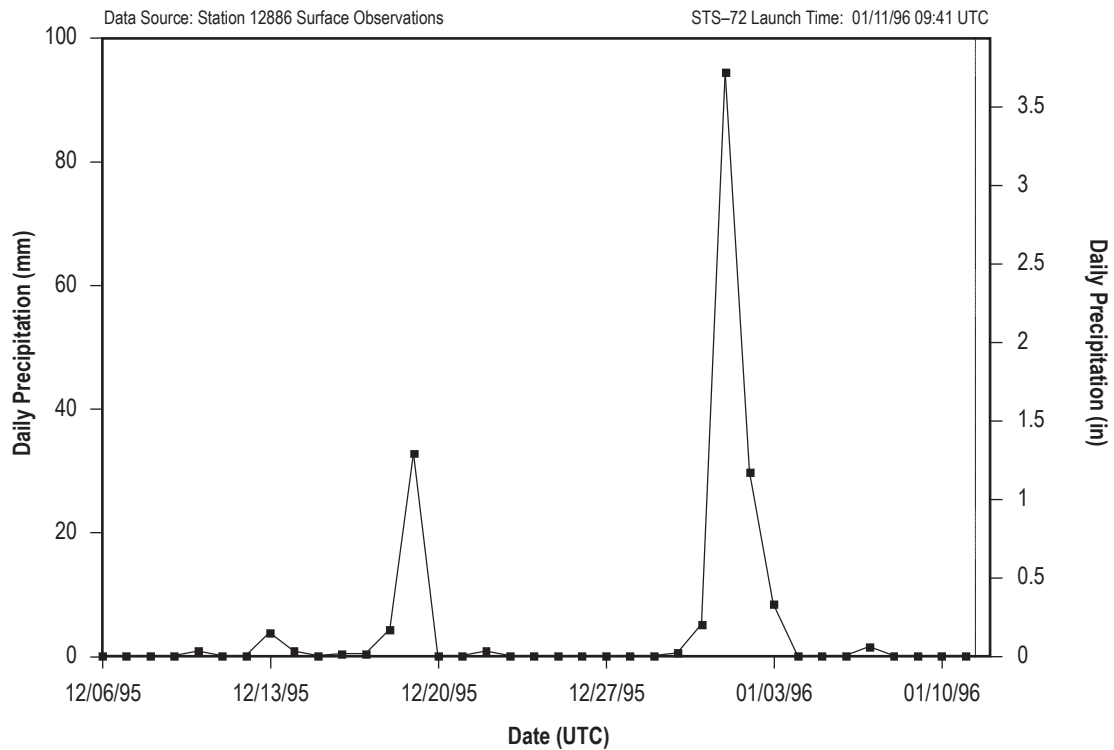


Figure 450. STS-72 daily precipitation totals.

## 5.75 STS–75

STS–75 was the 19th mission for *Columbia* (OV–102). It rolled out to pad 39B on January 29, 1996. STS–75 was exposed on the pad for 25 days and launched on February 22, 1996, at 20:18 UTC.

### 5.75.1 STS–75 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–75 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.75.2 STS–75 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–75 are shown in table 153. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 153. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 153. STS–75 L–0 surface observations.

Temperature	22.7 °C (72.8 °F)
Relative humidity	78%
Sea level pressure	1,014.6 hPa (29.96 inHg)
Wind speed	2.9 m/s (5.7 kt) (1-min average)
Wind direction	64° (1-min average)
Sky condition	2/8 cumulus at 1,140 m (3,740 ft); 8/8 cirrus at 8,700 m (28,543 ft)
Visibility	12.9 km (7 nmi)

### 5.75.3 STS–75 Pad Exposure Period Hourly Meteorological Parameters

Figures 451–456 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–75 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 154. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 154. STS–75 pad exposure period hourly extremes.

Minimum temperature	–0.6 °C (31 °F)
Maximum temperature	26.1 °C (79 °F)
Minimum relative humidity	23%
Maximum relative humidity	98%
Minimum sea level pressure	1,008.1 hPa (29.77 inHg)
Maximum sea level pressure	1,035.9 hPa (30.59 inHg)
Maximum wind speed and associated wind direction	18 m/s (35 kt) 251°
Total precipitation	29.7 mm (1.17 in)

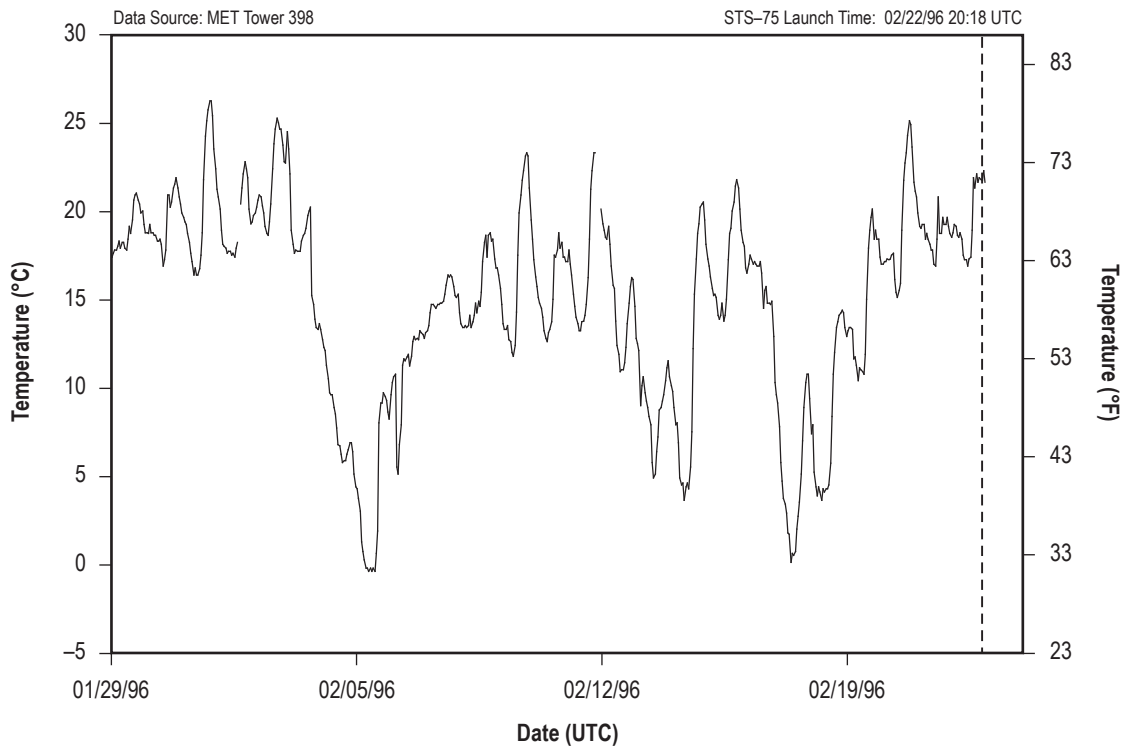


Figure 451. STS-75 hourly surface temperature.

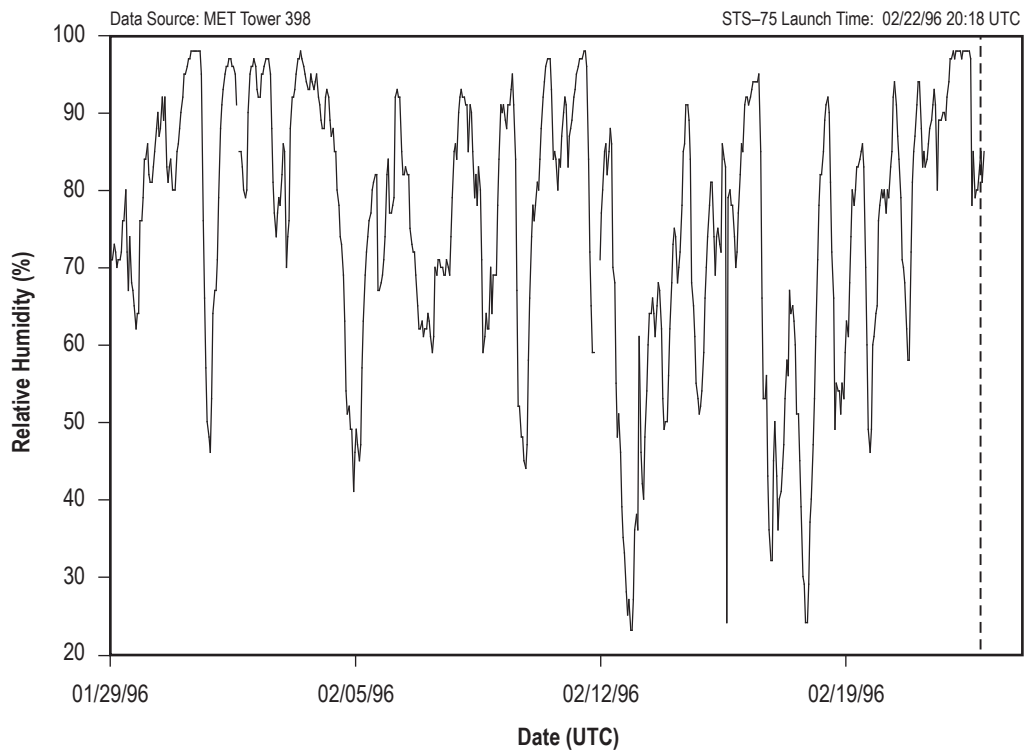


Figure 452. STS-75 hourly surface relative humidity.

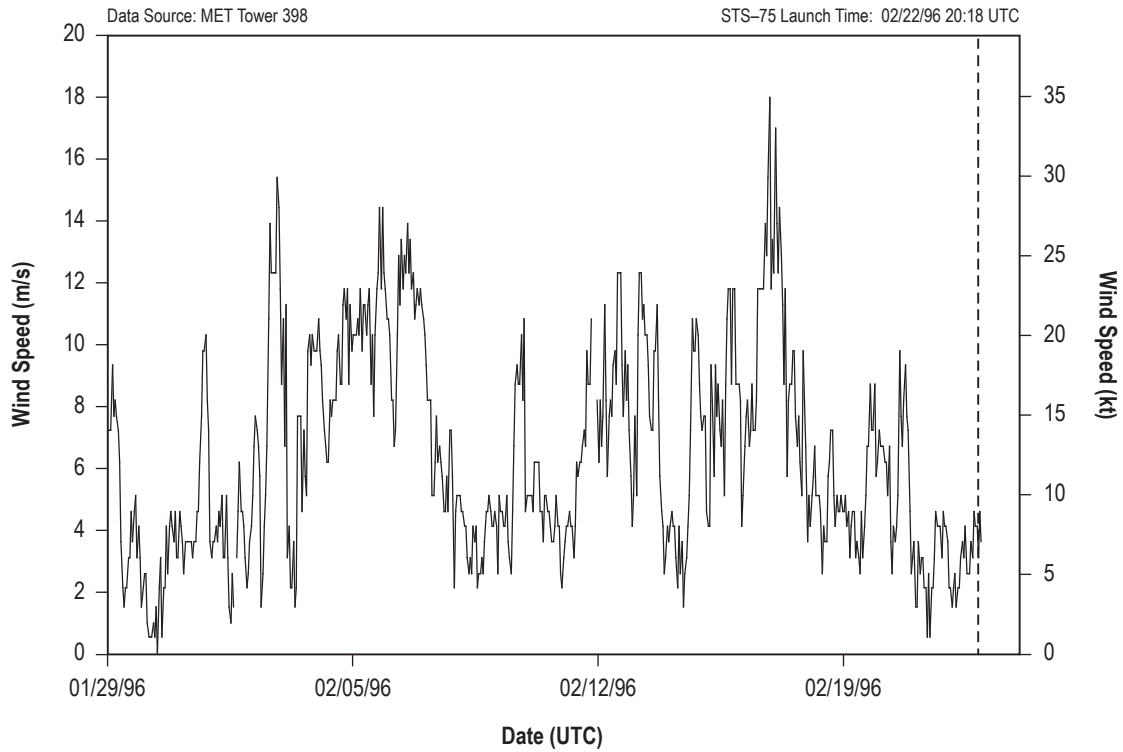


Figure 453. STS-75 hourly surface wind speed.

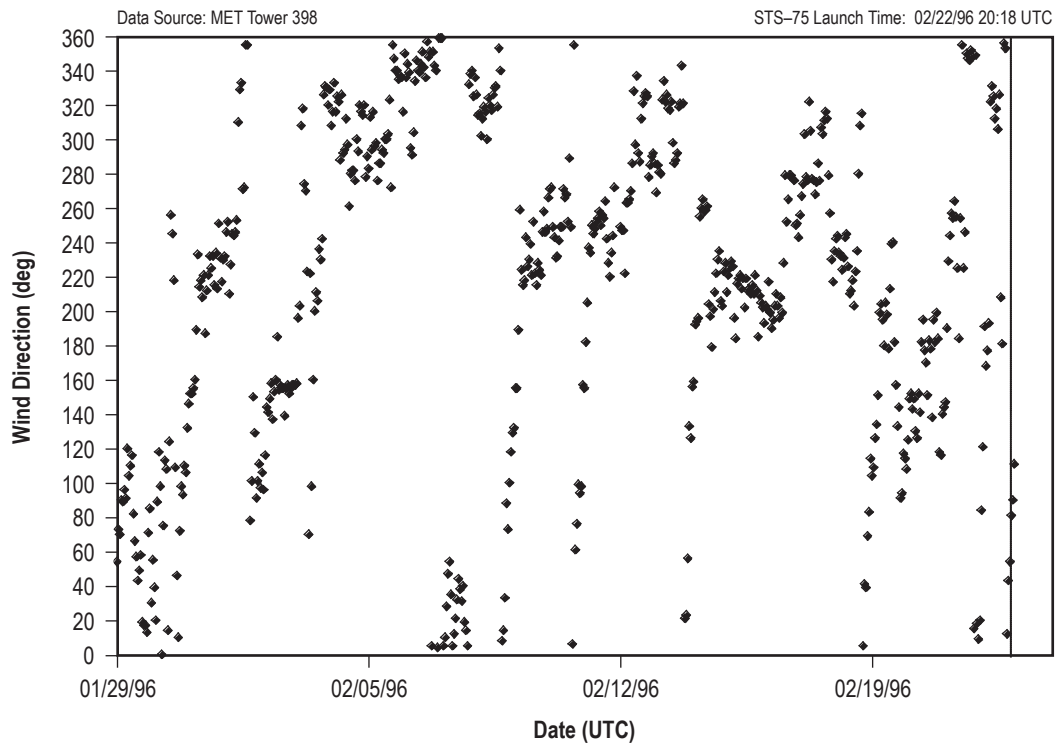


Figure 454. STS-75 hourly surface wind direction.

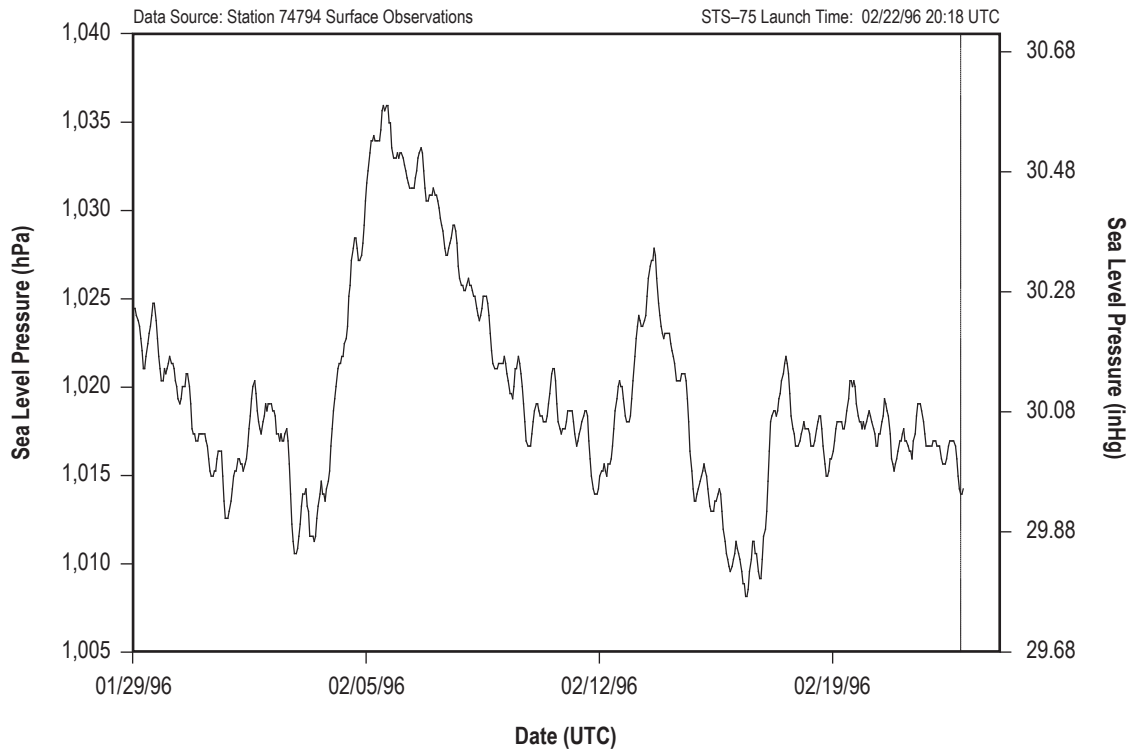


Figure 455. STS-75 hourly sea level pressure.

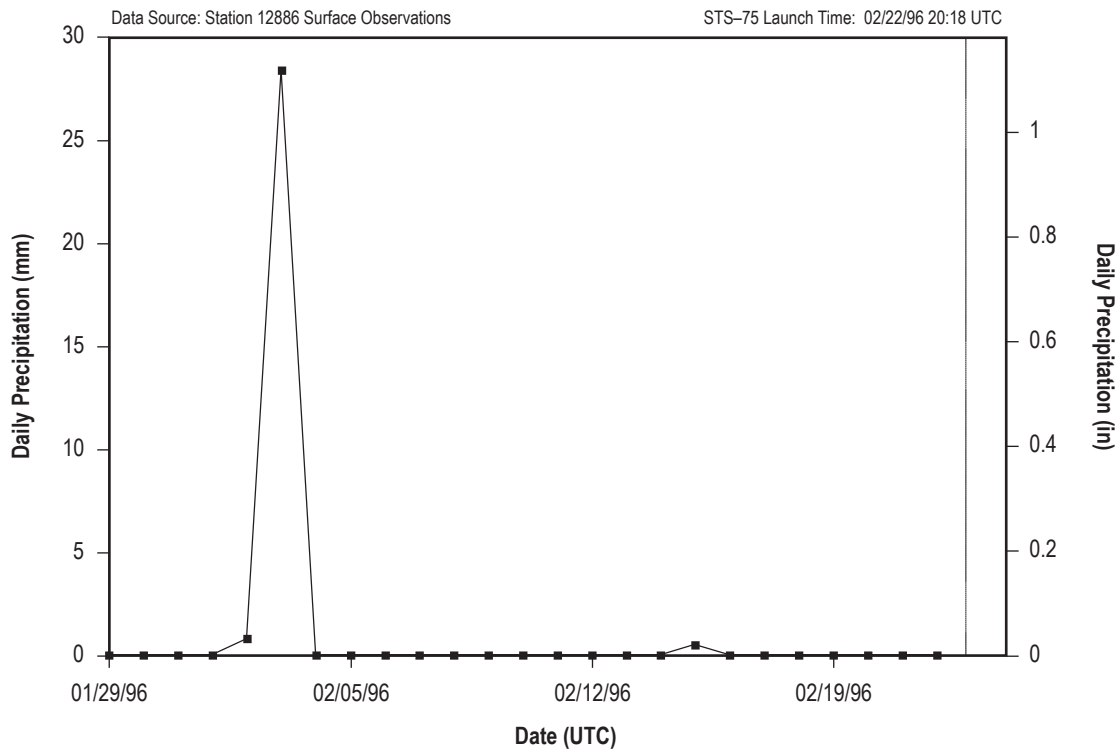


Figure 456. STS-75 daily precipitation totals.

## 5.76 STS–76

STS–76 was the 16th mission for *Atlantis* (OV–104). It rolled out to pad 39B on February 28, 1996. STS–76 was exposed on the pad for 22 days and launched on March 22, 1996, at 08:13 UTC.

### 5.76.1 STS–76 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–75 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.76.2 STS–76 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–76 are shown in table 155. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 155. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 155. STS–76 L–0 surface observations.

Temperature	7.3 °C (45.2 °F)
Relative humidity	88%
Sea level pressure	1,016 hPa (30 inHg)
Wind speed	3.8 m/s (7.3 kt) (1-min average)
Wind direction	253° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi)

### 5.76.3 STS–76 Pad Exposure Period Hourly Meteorological Parameters

Figures 457–462 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–76 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 156. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 156. STS–76 pad exposure period hourly extremes.

Minimum temperature	2.2 °C (36 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	27%
Maximum relative humidity	98%
Minimum sea level pressure	1,003.7 hPa (29.64 inHg)
Maximum sea level pressure	1,030.5 hPa (30.43 inHg)
Maximum wind speed and associated wind direction	24.7 m/s (48 kt) 345°
Total precipitation	237.2 mm (9.34 in)

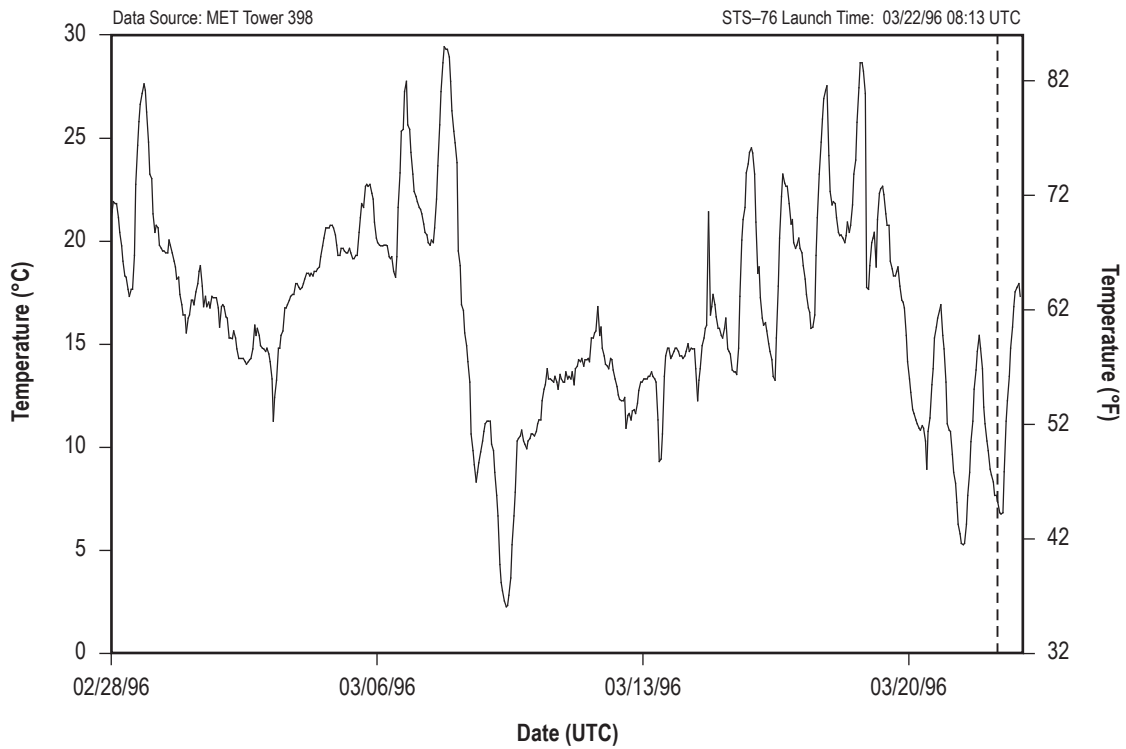


Figure 457. STS-76 hourly surface temperature.

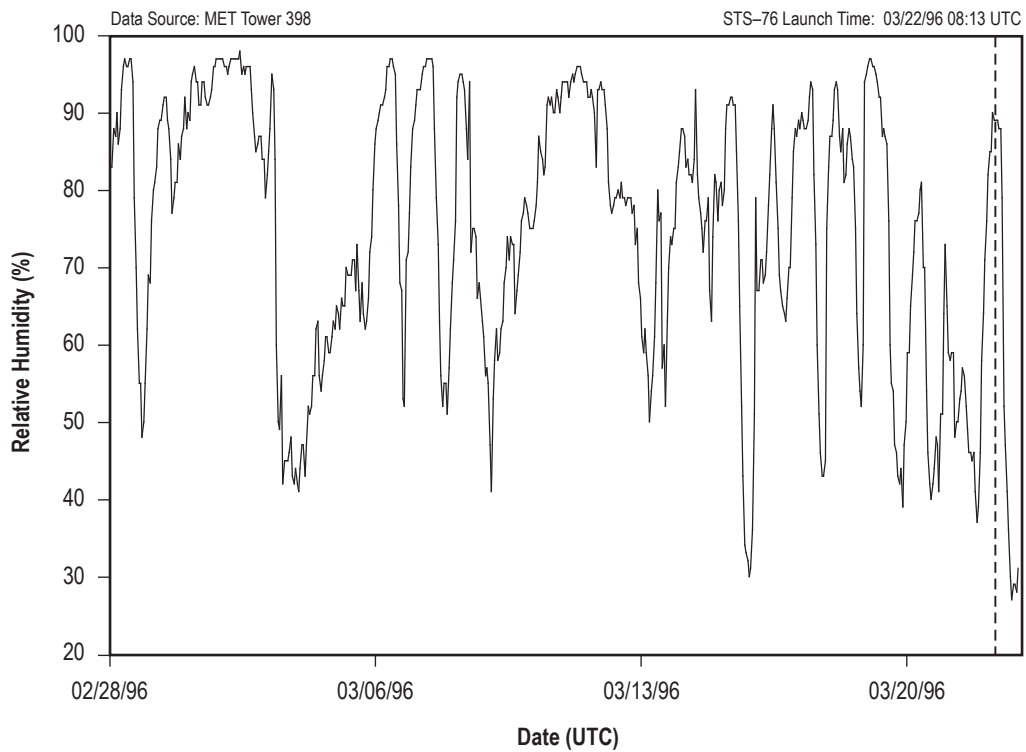


Figure 458. STS-76 hourly surface relative humidity.

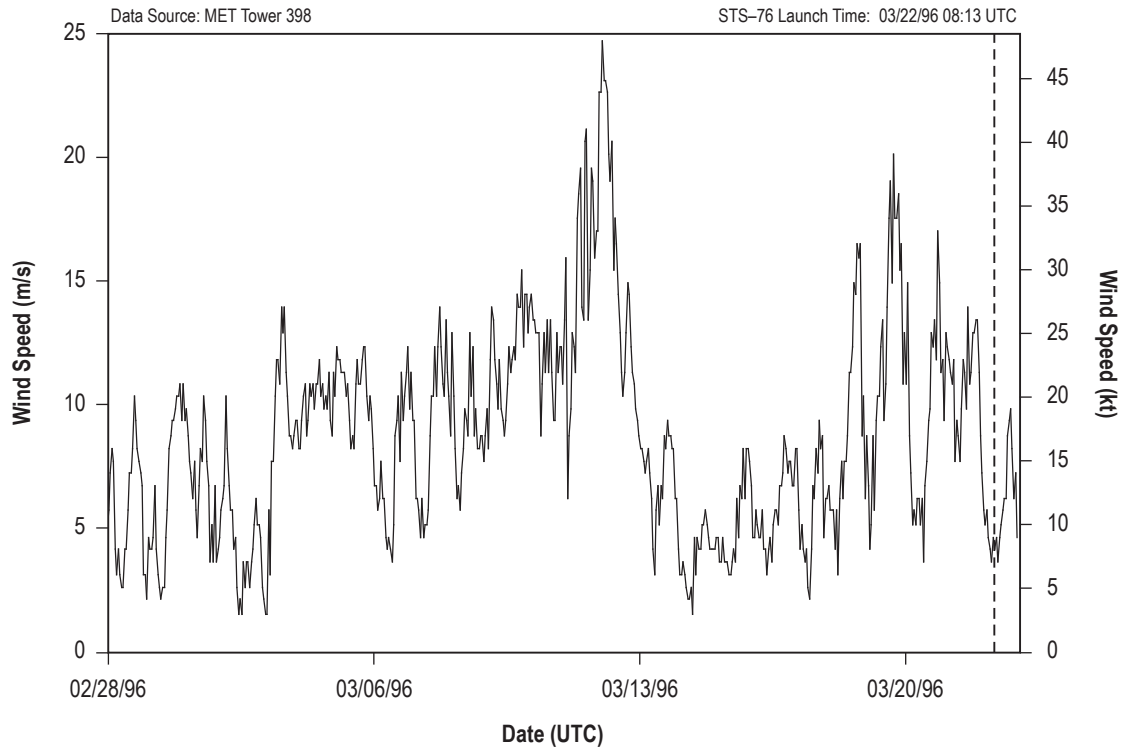


Figure 459. STS-76 hourly surface wind speed.

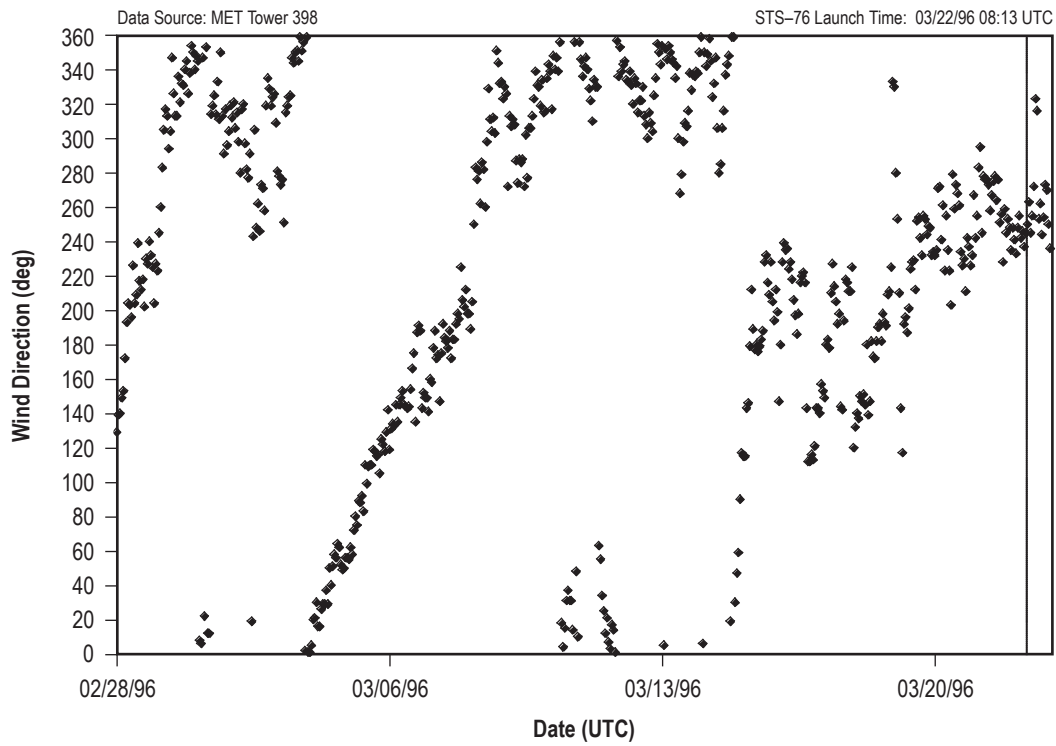


Figure 460. STS-76 hourly surface wind direction.



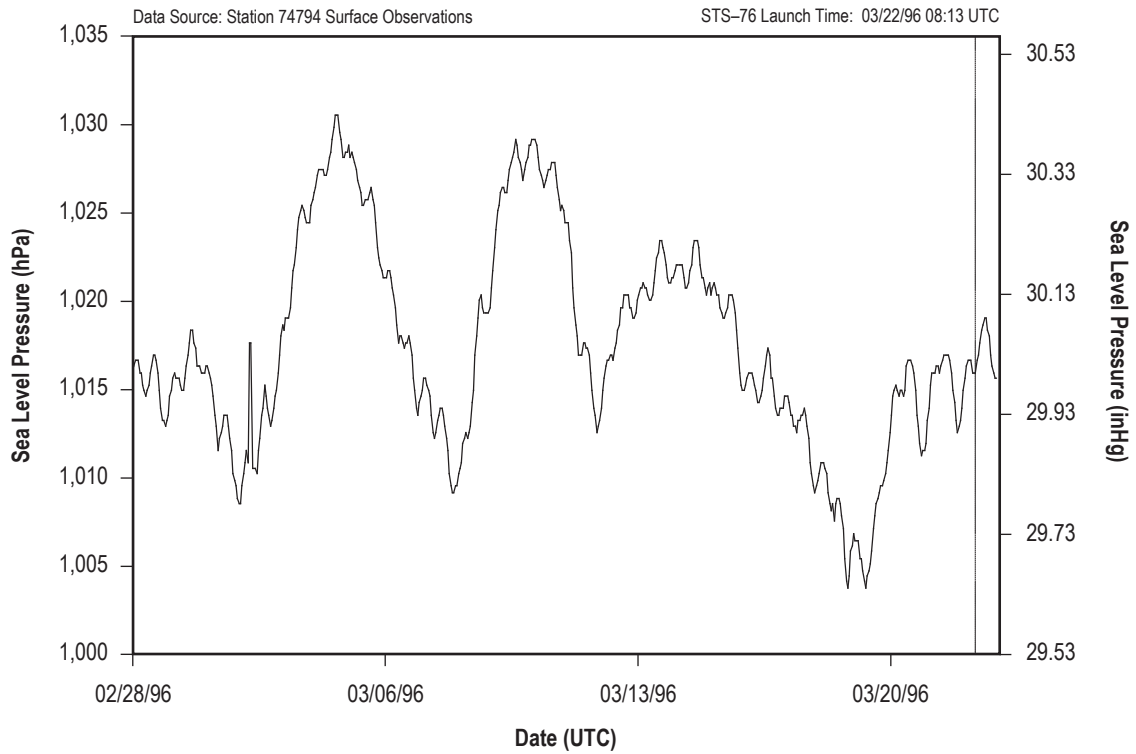


Figure 461. STS-76 hourly sea level pressure.

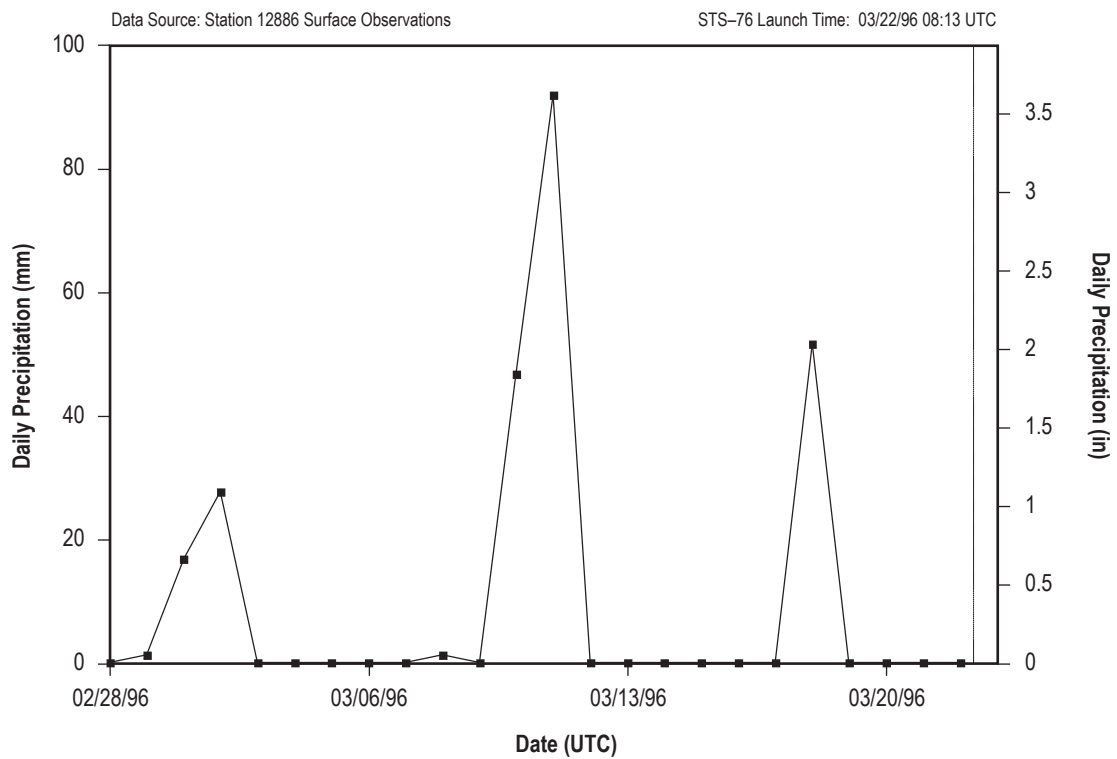


Figure 462. STS-76 daily precipitation totals.

## 5.77 STS–77

STS–77 was the 11th mission for *Endeavour* (OV–105). It rolled out to pad 39B on April 16, 1996. STS–77 was exposed on the pad for 33 days and launched on May 19, 1996, at 10:30 UTC.

### 5.77.1 STS–77 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–77 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.77.2 STS–77 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–77 are shown in table 157. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 157. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 157. STS–77 L–0 surface observations.

Temperature	21.3 °C (70.3 °F)
Relative humidity	95%
Sea level pressure	1,018.7 hPa (30.08 inHg)
Wind speed	0.8 m/s (1.6 kt) (1-min average)
Wind direction	239° (1-min average)
Sky condition	3/8 altocumulus at 3,658 m (12,000 ft); 2/8 cirrostratus at 6,400 m (21,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.77.3 STS–77 Pad Exposure Period Hourly Meteorological Parameters

Figures 463–468 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–77 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 158. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Precipitation was measured at station 12886. Sea level pressure was measured at station 74794.

Table 158. STS–77 pad exposure period hourly extremes.

Minimum temperature	16.1 °C (61 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	46%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.5 hPa (29.9 inHg)
Maximum sea level pressure	1,026.1 hPa (30.3 inHg)
Maximum wind speed and associated wind direction	16 m/s (31 kt) 163°
Total precipitation	24.6 mm (0.97 in)

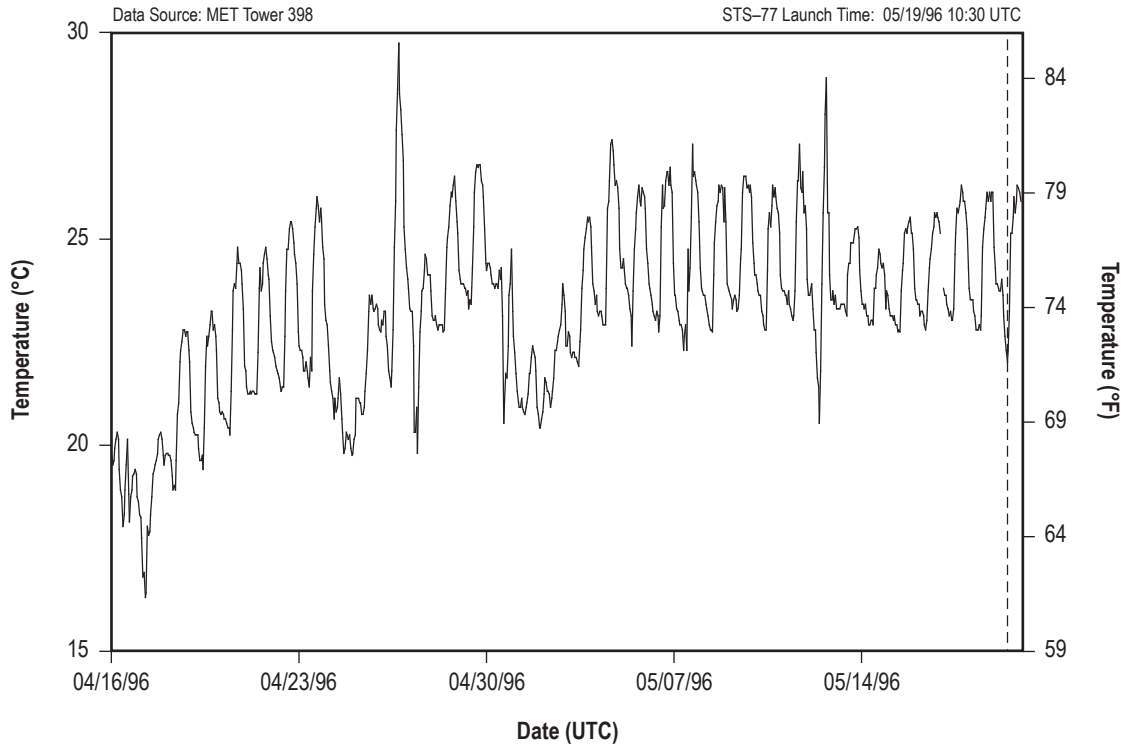


Figure 463. STS-77 hourly surface temperature.

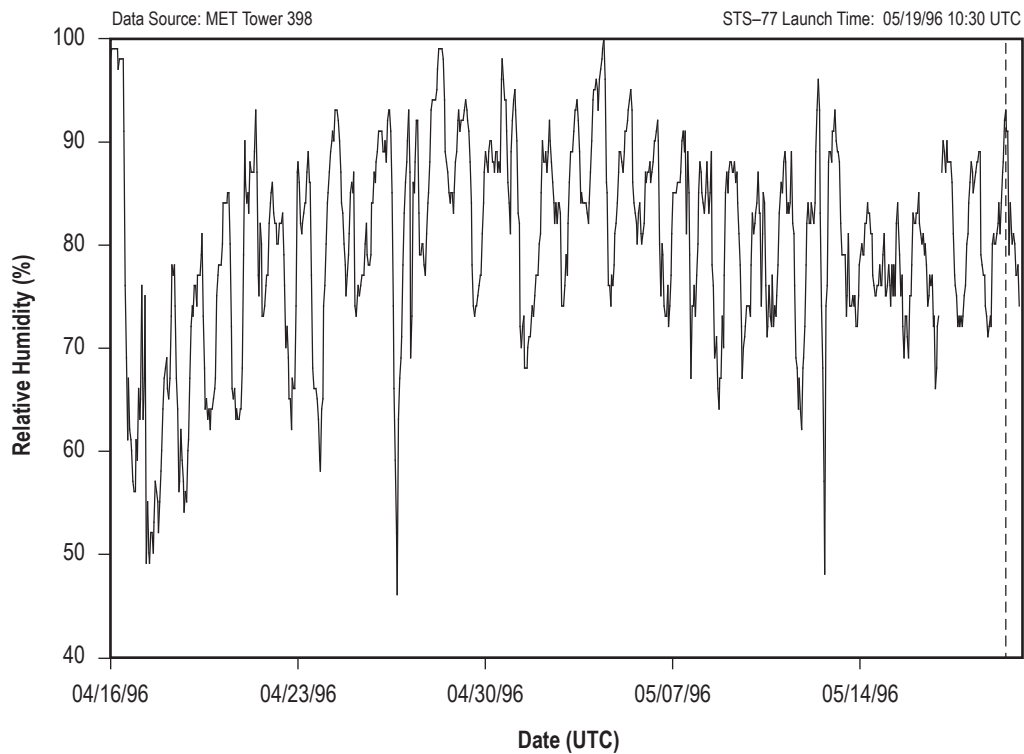


Figure 464. STS-77 hourly surface relative humidity.

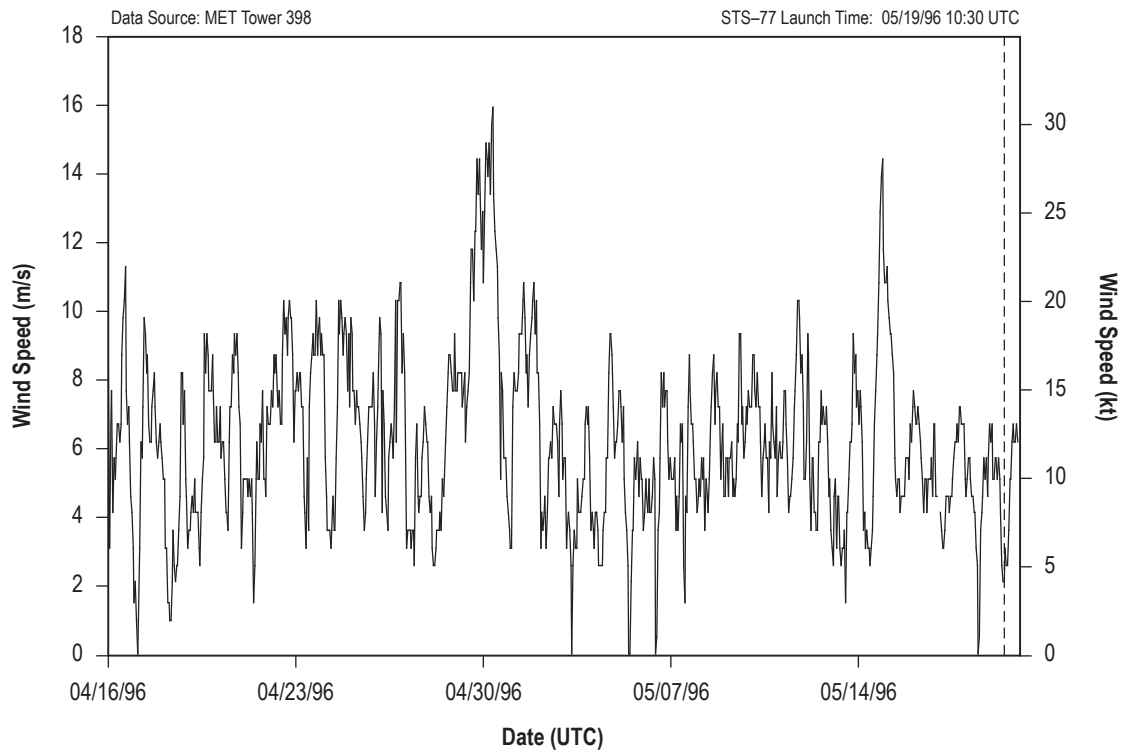


Figure 465. STS-77 hourly surface wind speed.

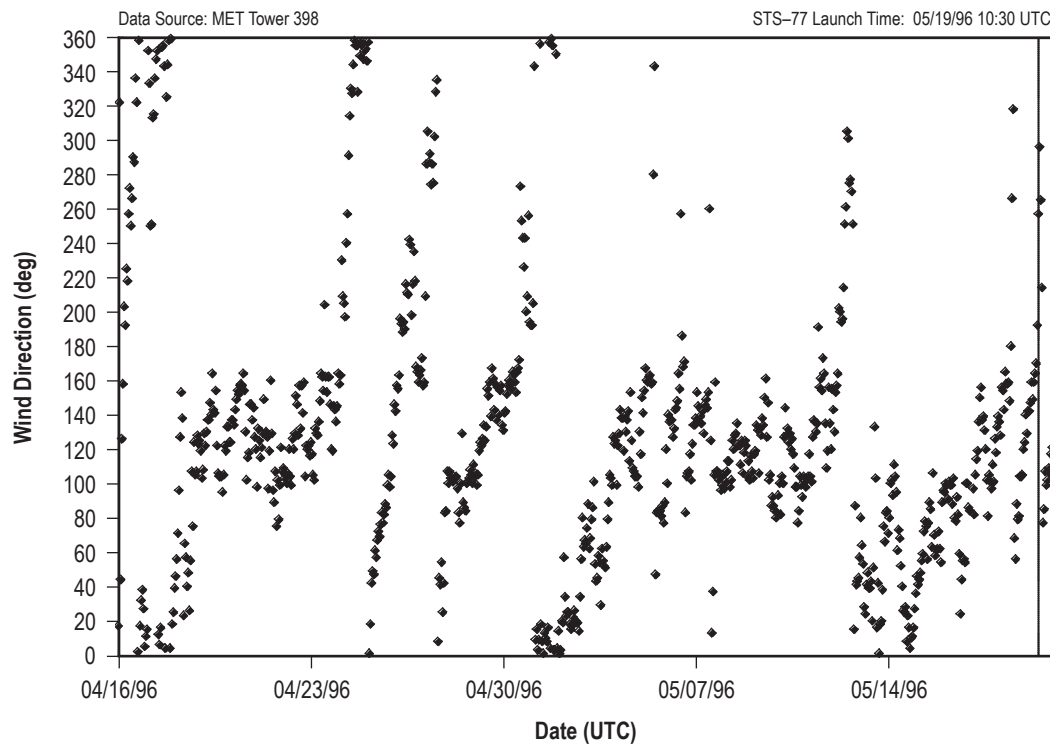


Figure 466. STS-77 hourly surface wind direction.

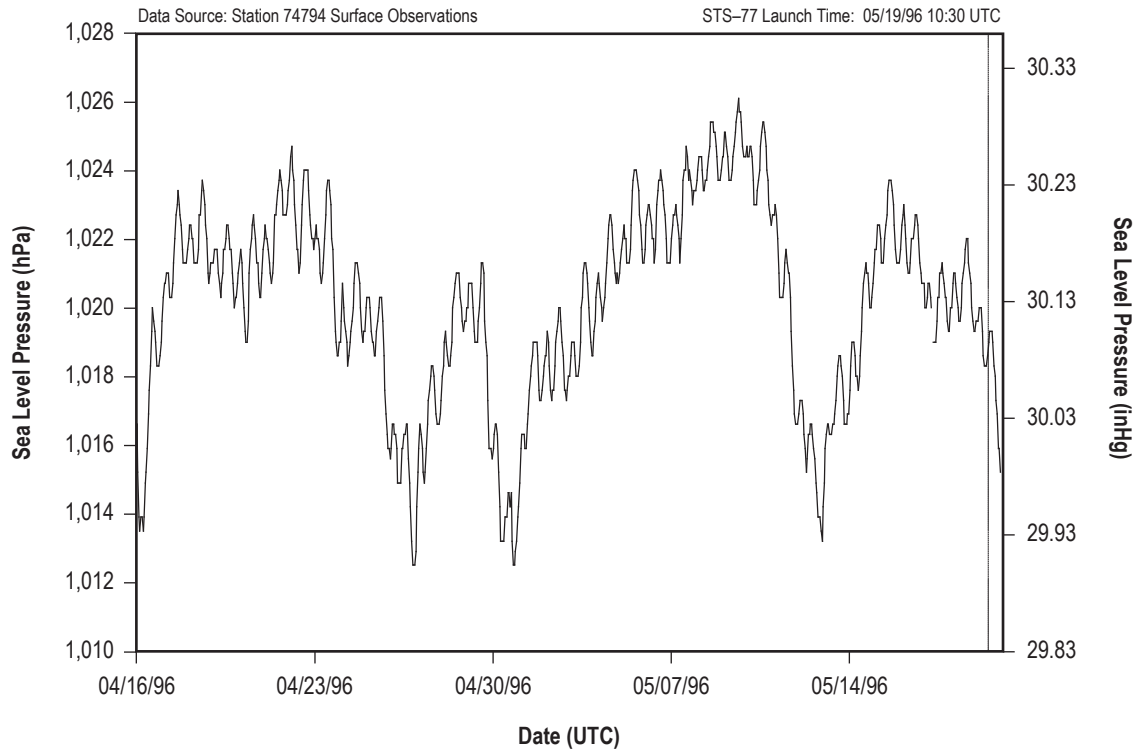


Figure 467. STS-77 hourly sea level pressure.

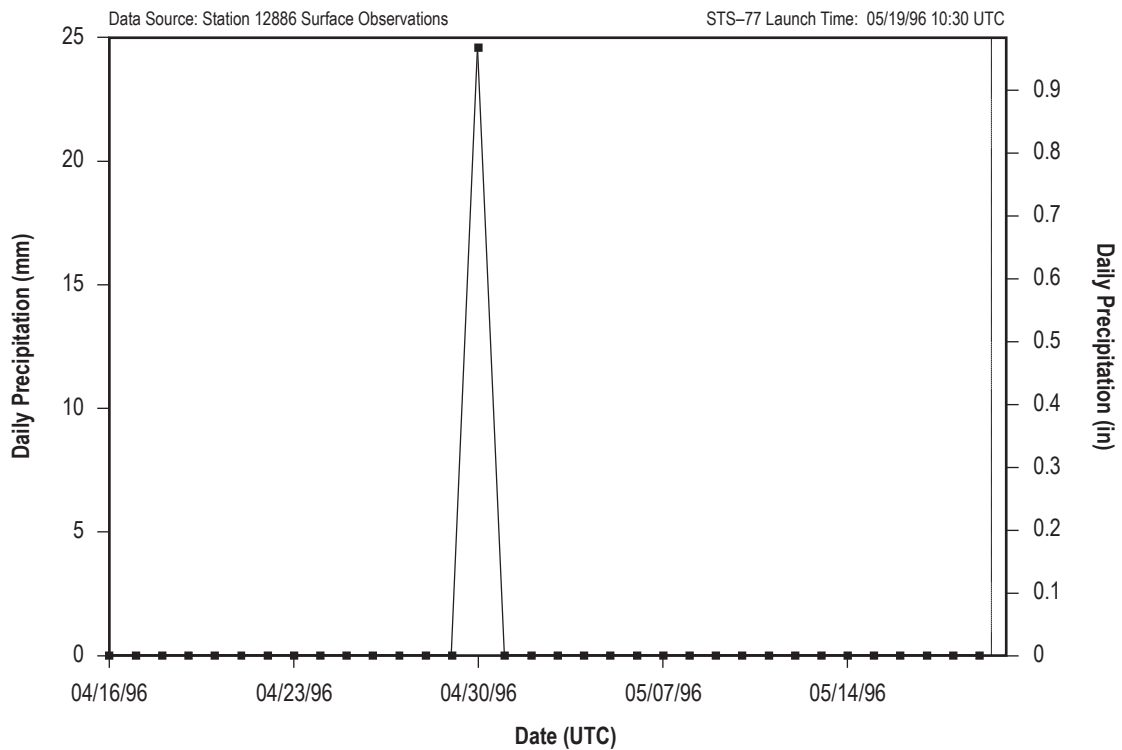


Figure 468. STS-77 daily precipitation totals.

## 5.78 STS–78

STS–78 was the 20th mission for *Columbia* (OV–102). It rolled out to pad 39B on May 30, 1996. STS–78 was exposed on the pad for 22 days and launched on June 20, 1996, at 14:49 UTC.

### 5.78.1 STS–78 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–78 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.78.2 STS–78 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–78 are shown in table 159. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 159.

Table 159. STS–78 L–0 surface observations.

Temperature	28.4 °C (83.1 °F)
Relative humidity	77%
Sea level pressure	1,015.6 hPa (29.99 inHg)
Wind speed	0.8 m/s (1.6 kt) (1-min average)
Wind direction	266° (1-min average)
Sky condition	1/8 cumulus at 732 m (2,400 ft); 7/8 cirrus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.78.3 STS–78 Pad Exposure Period Hourly Meteorological Parameters

Figures 469–474 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–78 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 160. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 160. STS–78 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	58%
Maximum relative humidity	99%
Minimum sea level pressure	1,010.8 hPa (29.85 inHg)
Maximum sea level pressure	1,022.4 hPa (30.19 inHg)
Maximum wind speed and associated wind direction	15.4 m/s (30 kt) 68°
Total precipitation	219.4 mm (8.64 in)

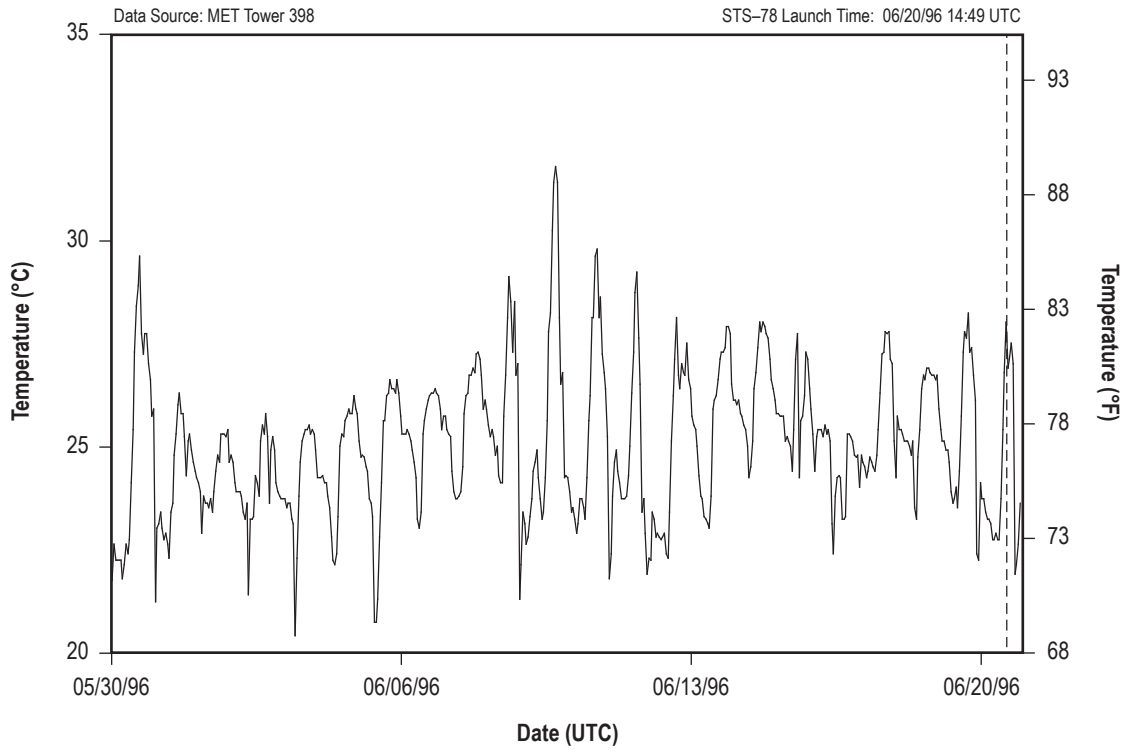


Figure 469. STS-78 hourly surface temperature.

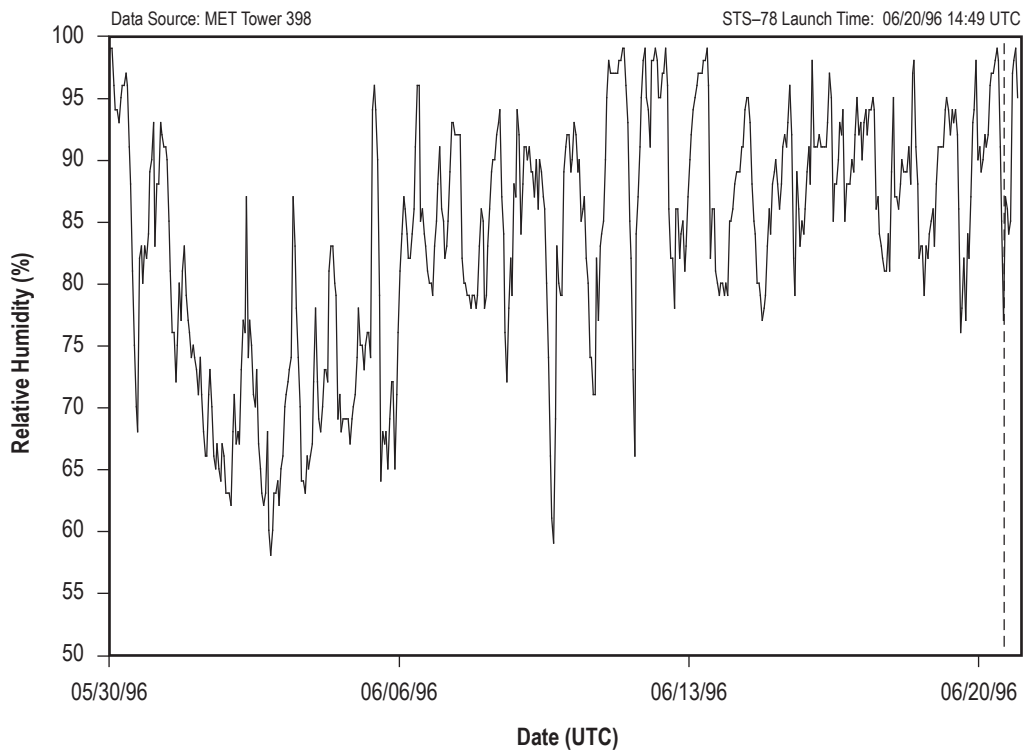


Figure 470. STS-78 hourly surface relative humidity.

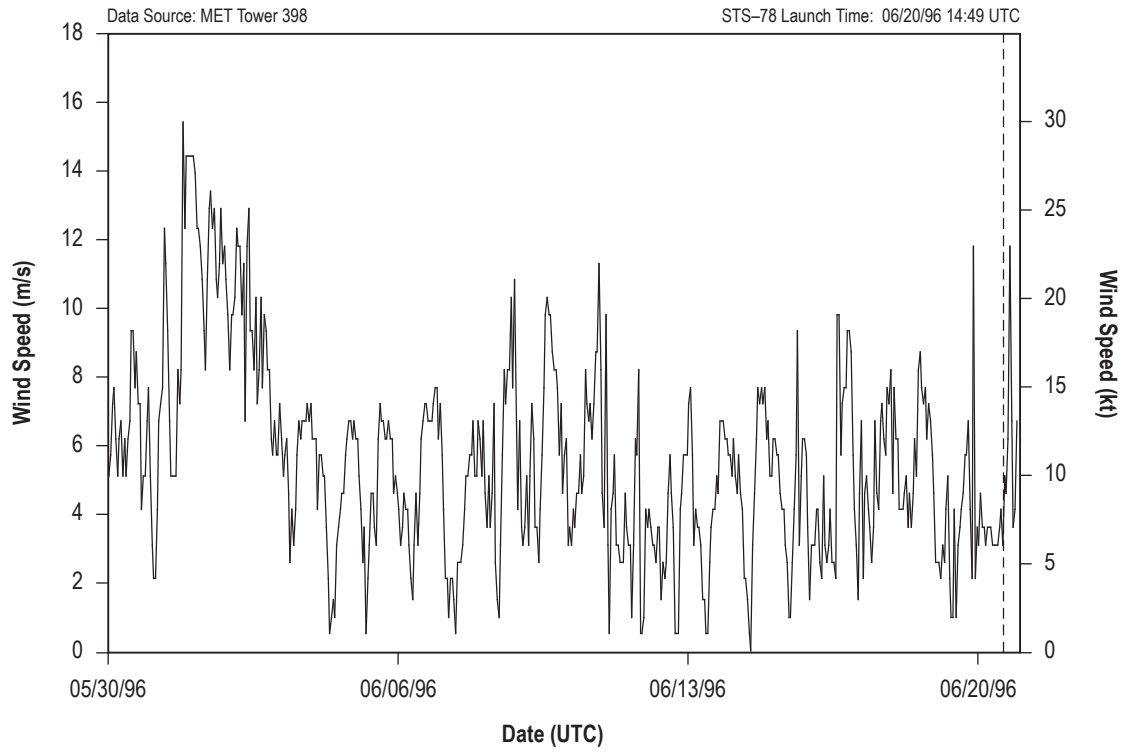


Figure 471. STS-78 hourly surface wind speed.

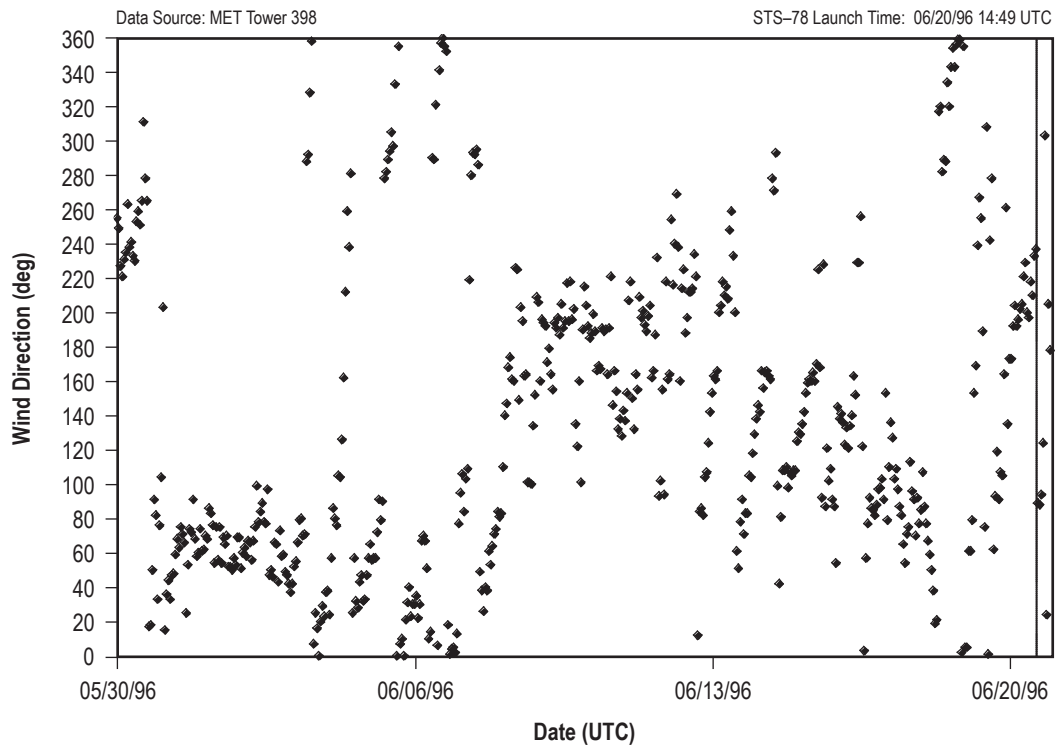


Figure 472. STS-78 hourly surface wind direction.



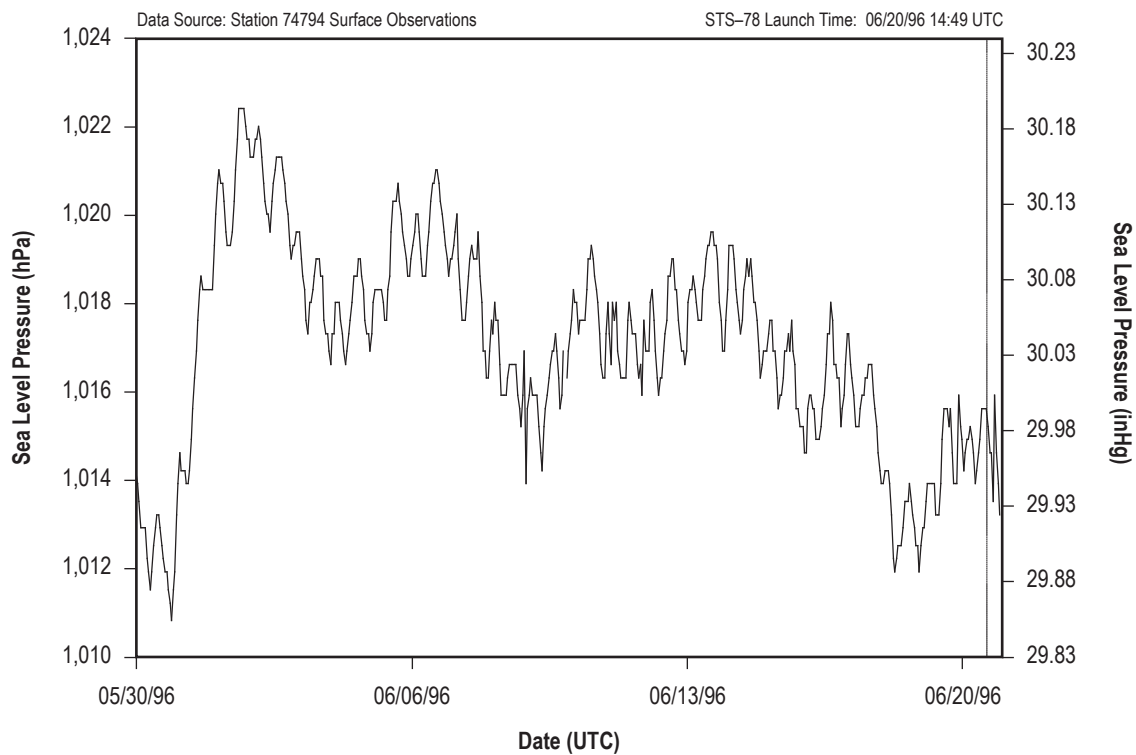


Figure 473. STS-78 hourly sea level pressure.

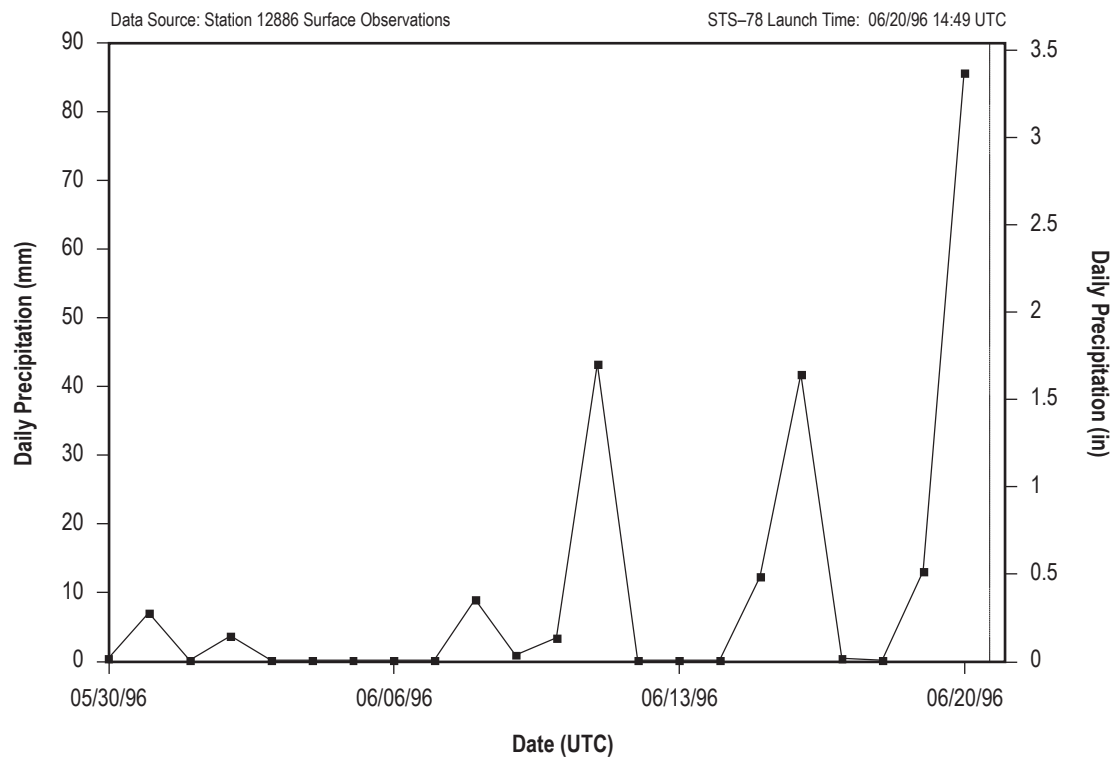


Figure 474. STS-78 daily precipitation totals.

## 5.79 STS-79

STS-79 was the 17th mission for *Atlantis* (OV-104). It rolled out to pad 39A the first time on July 1, 1996, and was rolled back from the pad on July 10, 1996. STS-79 rolled out to pad 39A the second time on August 20, 1996, and was rolled back from the pad on September 4, 1996. STS-79 rolled out to pad 39A the third time on September 5, 1996. STS-79 was exposed on the pad for a total of 37 days (10 days after the first rollout, 16 days after the second rollout, and 11 days after the third rollout) and launched on September 16, 1996, at 08:55 UTC.

### 5.79.1 STS-79 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-79 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.79.2 STS-79 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-79 are shown in table 161. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 161. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 161. STS-79 L-0 surface observations.

Temperature	26 °C (78.8 °F)
Relative humidity	86%
Sea level pressure	1,014 hPa (29.94 inHg)
Wind speed	4.2 m/s (8.2 kt) (1-min average)
Wind direction	153° (1-min average)
Sky condition	1/8 cumulus at 610 m (2,000 ft)
Visibility	12.9 km (6.9 nmi)

### 5.79.3 STS-79 Pad Exposure Period Hourly Meteorological Parameters

Figures 475–480 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-79 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 162. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 162. STS-79 pad exposure period hourly extremes.

Minimum temperature	22.2 °C (72 °F)
Maximum temperature	32.8 °C (91 °F)
Minimum relative humidity	53%
Maximum relative humidity	100%
Minimum sea level pressure	1,005.8 hPa (29.7 inHg)
Maximum sea level pressure	1,022 hPa (30.18 inHg)
Maximum wind speed and associated wind direction	14.4 m/s (28 kt) 351°
Total precipitation	251.7 mm (9.91 in)

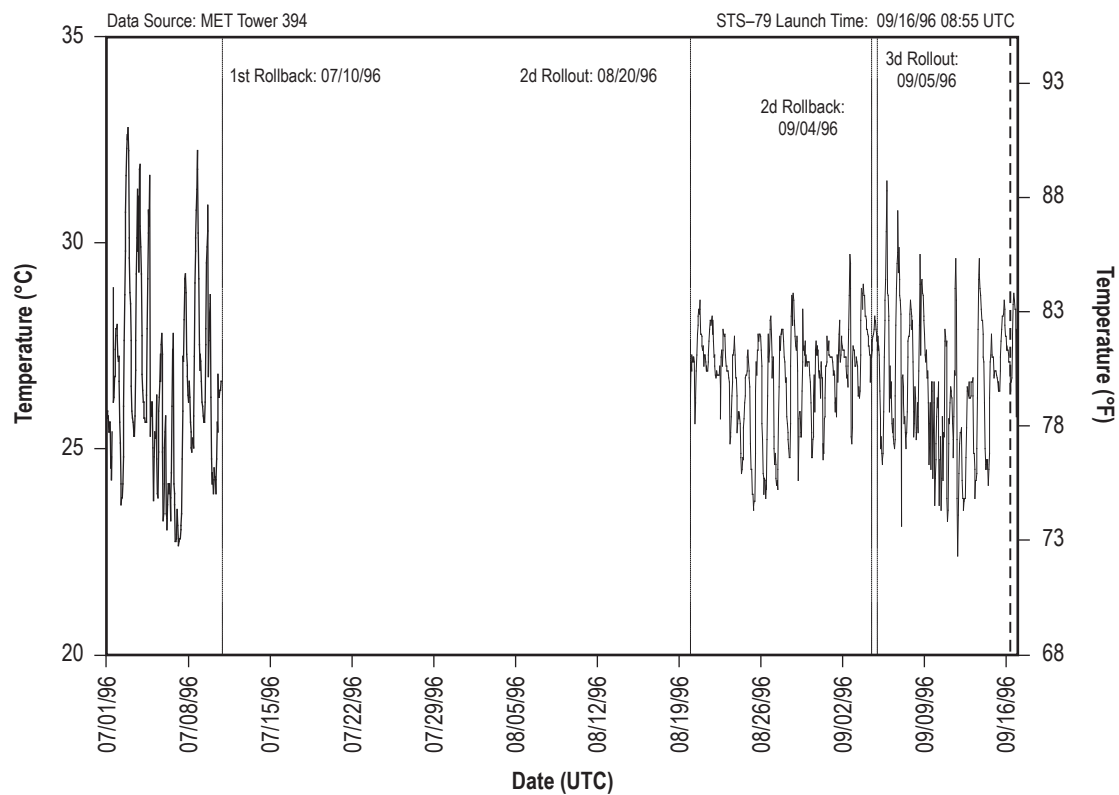


Figure 475. STS-79 hourly surface temperature.

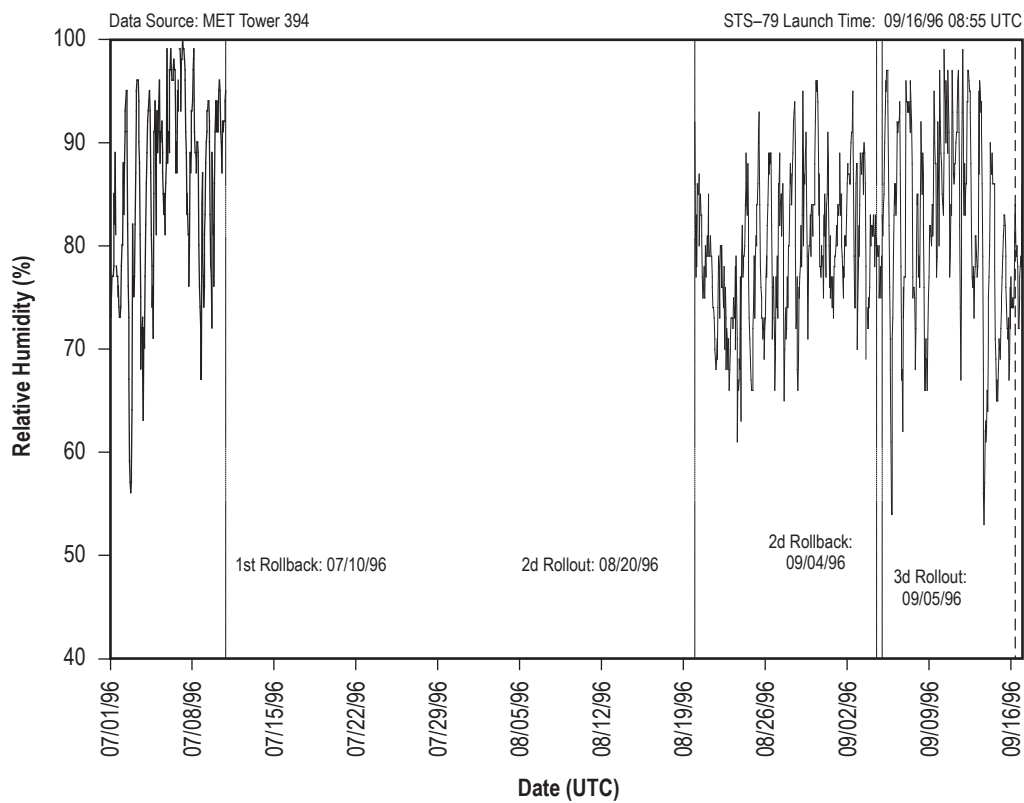


Figure 476. STS-79 hourly surface relative humidity.

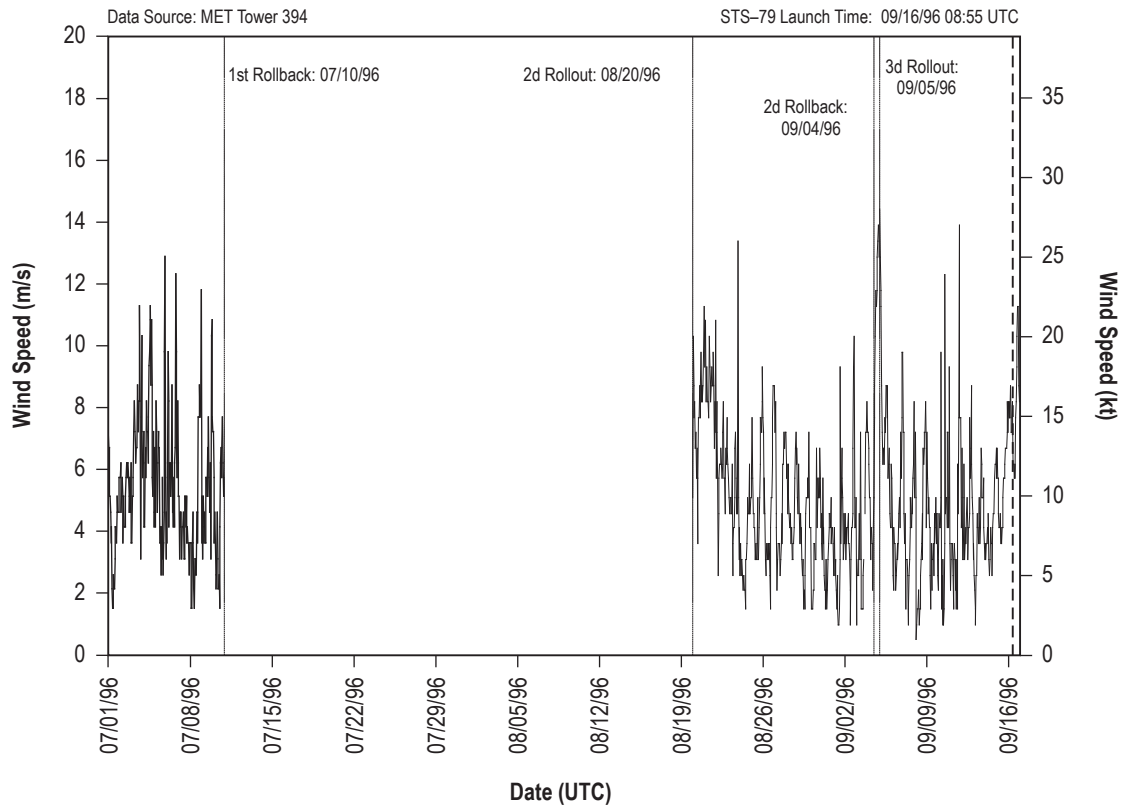


Figure 477. STS-79 hourly surface wind speed.

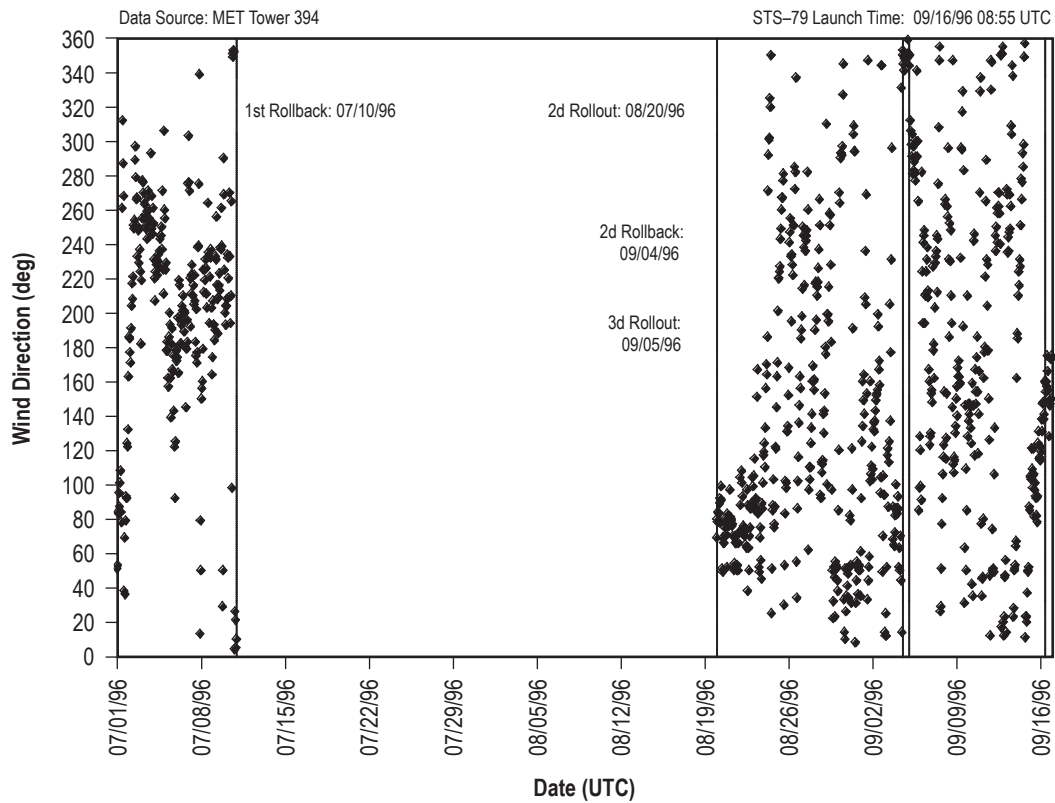


Figure 478. STS-79 hourly surface wind direction.

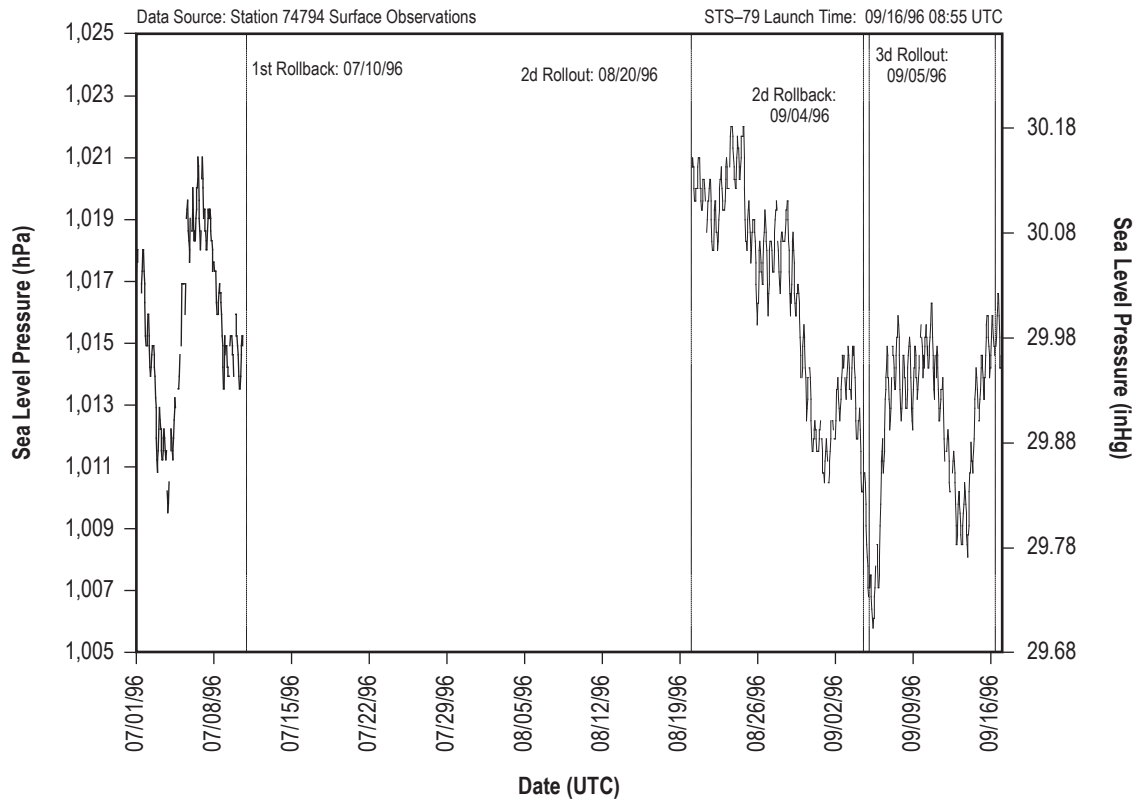


Figure 479. STS-79 hourly sea level pressure.

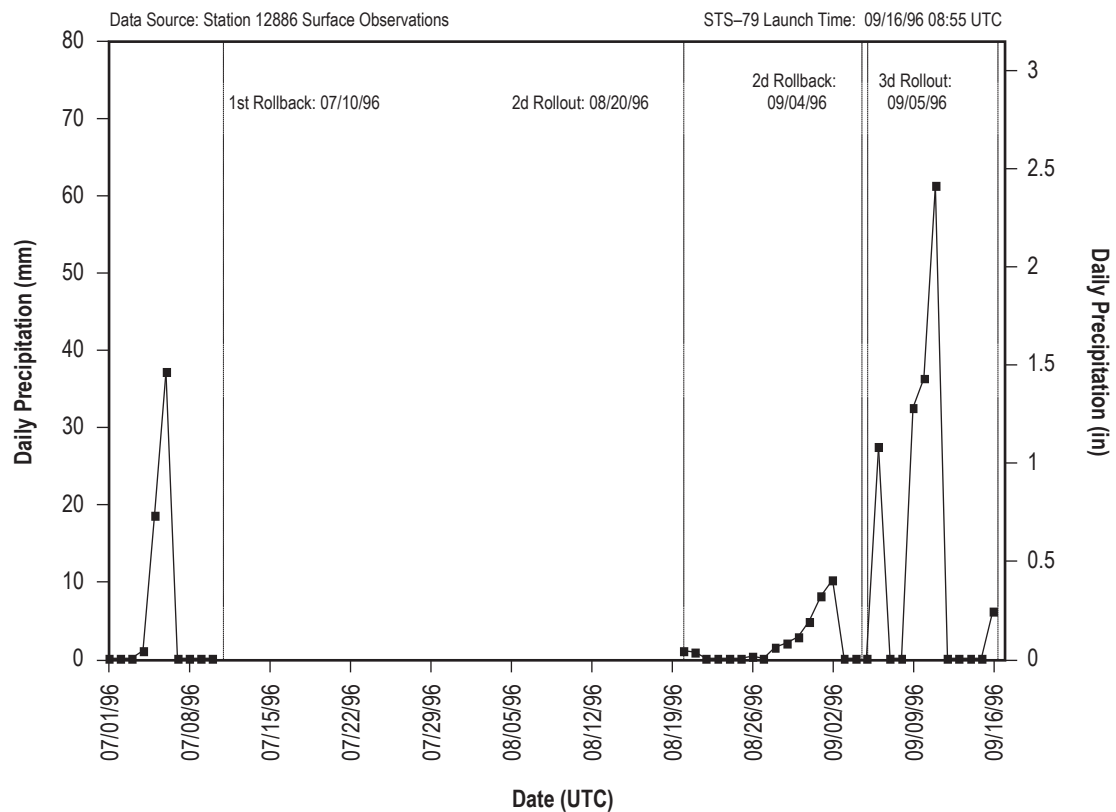


Figure 480. STS-79 daily precipitation totals.

## 5.80 STS–80

STS–80 was the 21st mission for *Columbia* (OV–102). It rolled out to pad 39B on October 16, 1996. STS–80 was exposed on the pad for 35 days and launched on November 19, 1996, at 19:56 UTC.

### 5.80.1 STS–80 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–80 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.80.2 STS–80 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–80 are shown in table 163. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 163. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 163. STS–80 L–0 surface observations.

Temperature	25.1 °C (77.2 °F)
Relative humidity	49%
Sea level pressure	1,011.9 hPa (29.88 inHg)
Wind speed	3.2 m/s (6.2 kt) (1-min average)
Wind direction	240° (1-min average)
Sky condition	1/8 cumulus at 1,676 m (5,500 ft); 5/8 stratocumulus at 1,829 m (6,000 ft); 2/8 cirrostratus at 8,839 m (29,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.80.3 STS–80 Pad Exposure Period Hourly Meteorological Parameters

Figures 481–486 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–80 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 164. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 164. STS–80 pad exposure period hourly extremes.

Minimum temperature	10.6 °C (51 °F)
Maximum temperature	28.9 °C (84 °F)
Minimum relative humidity	32%
Maximum relative humidity	99%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,031.1 hPa (30.45 inHg)
Maximum wind speed and associated wind direction	19.6 m/s (38 kt) 56°
Total precipitation	15 mm (0.59 in)

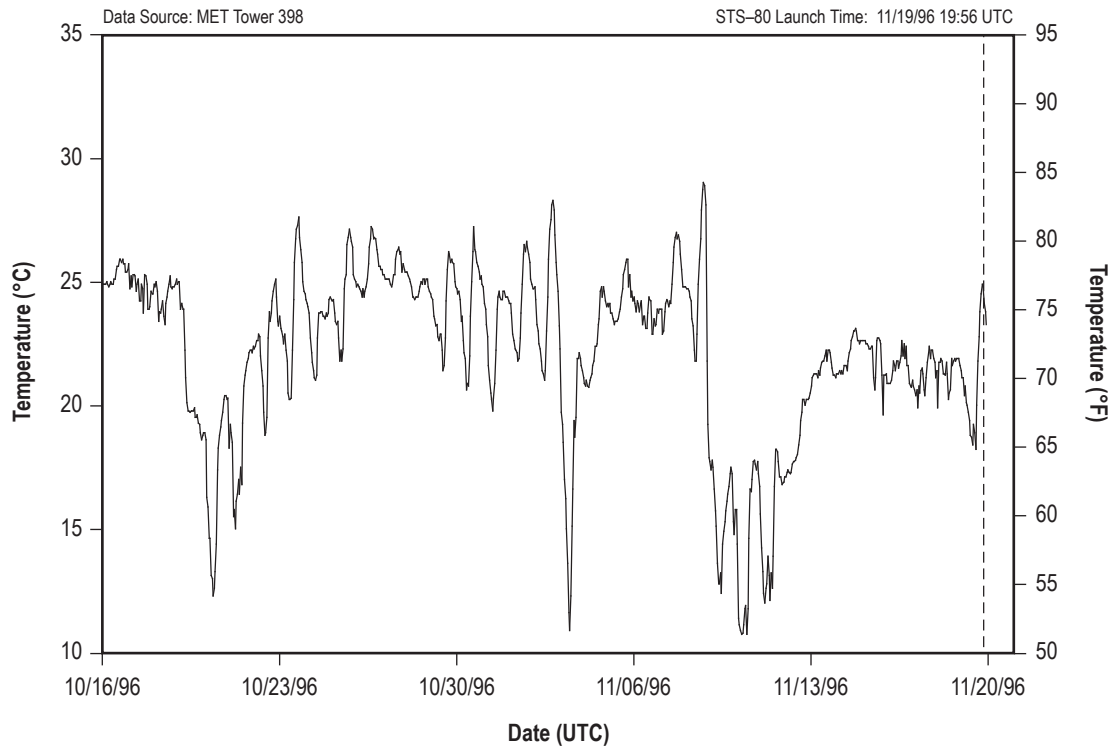


Figure 481. STS-80 hourly surface temperature.

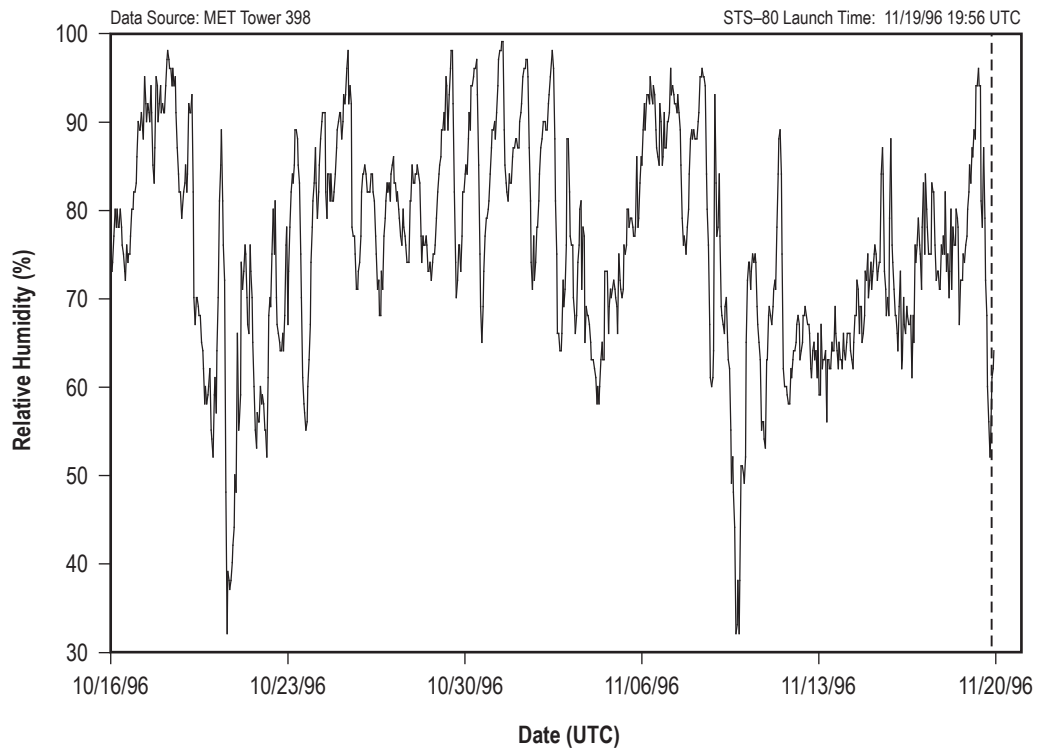


Figure 482. STS-80 hourly surface relative humidity.

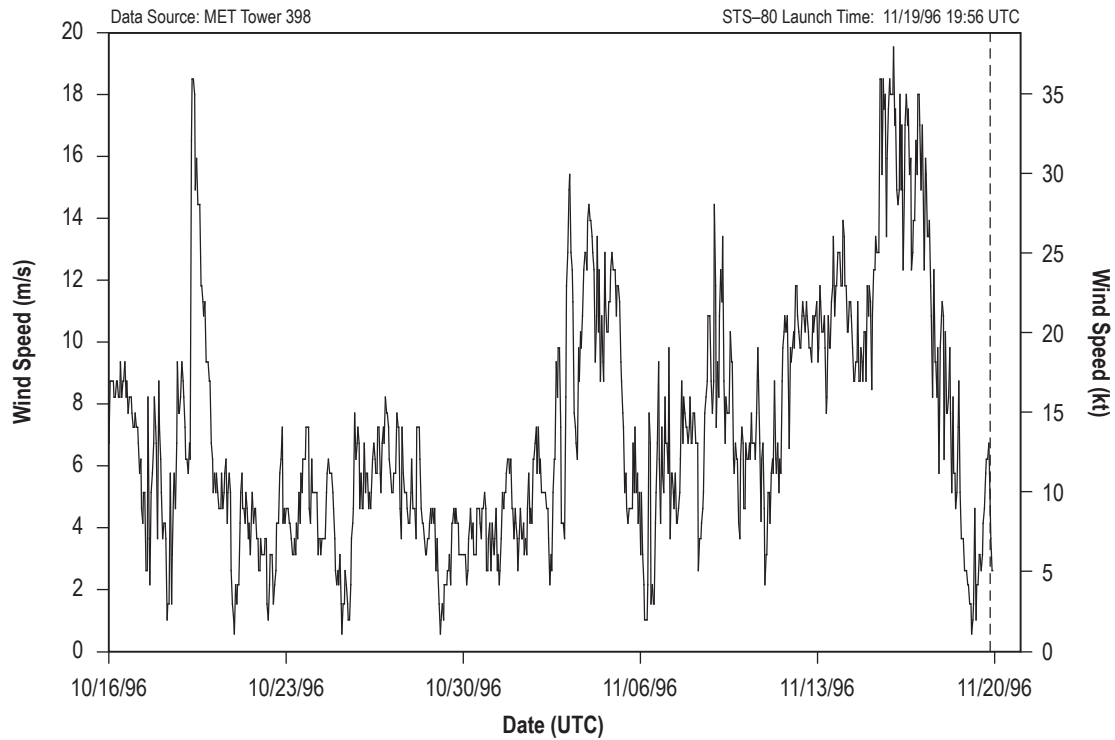


Figure 483. STS-80 hourly surface wind speed.

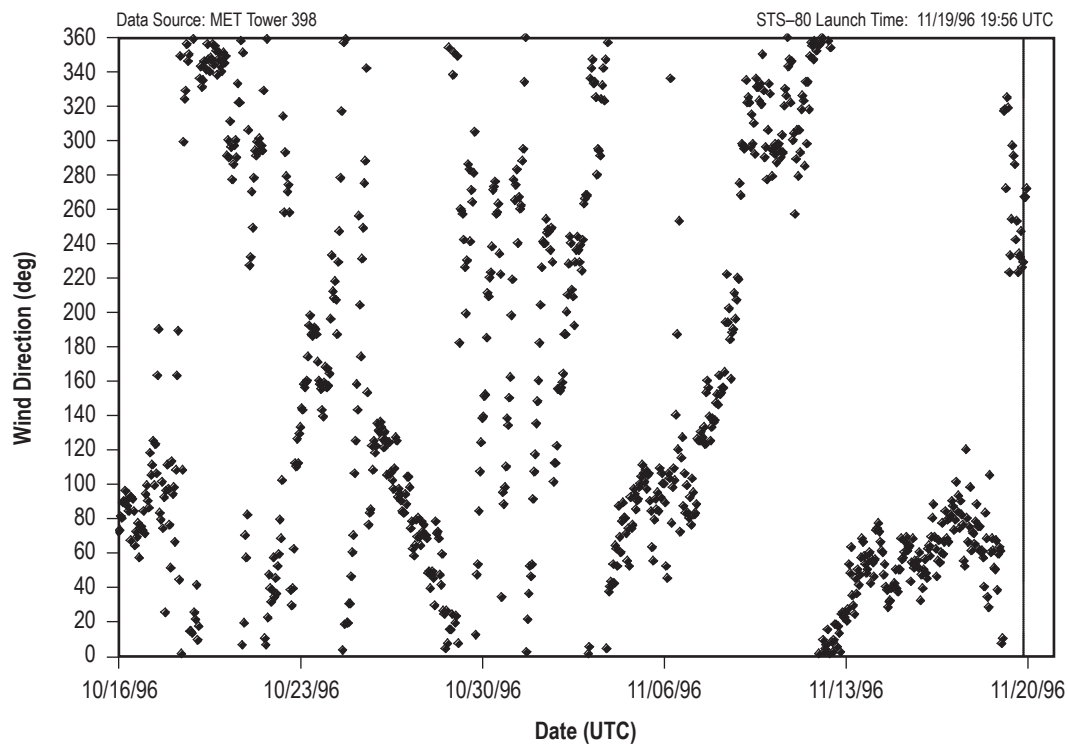


Figure 484. STS-80 hourly surface wind direction.



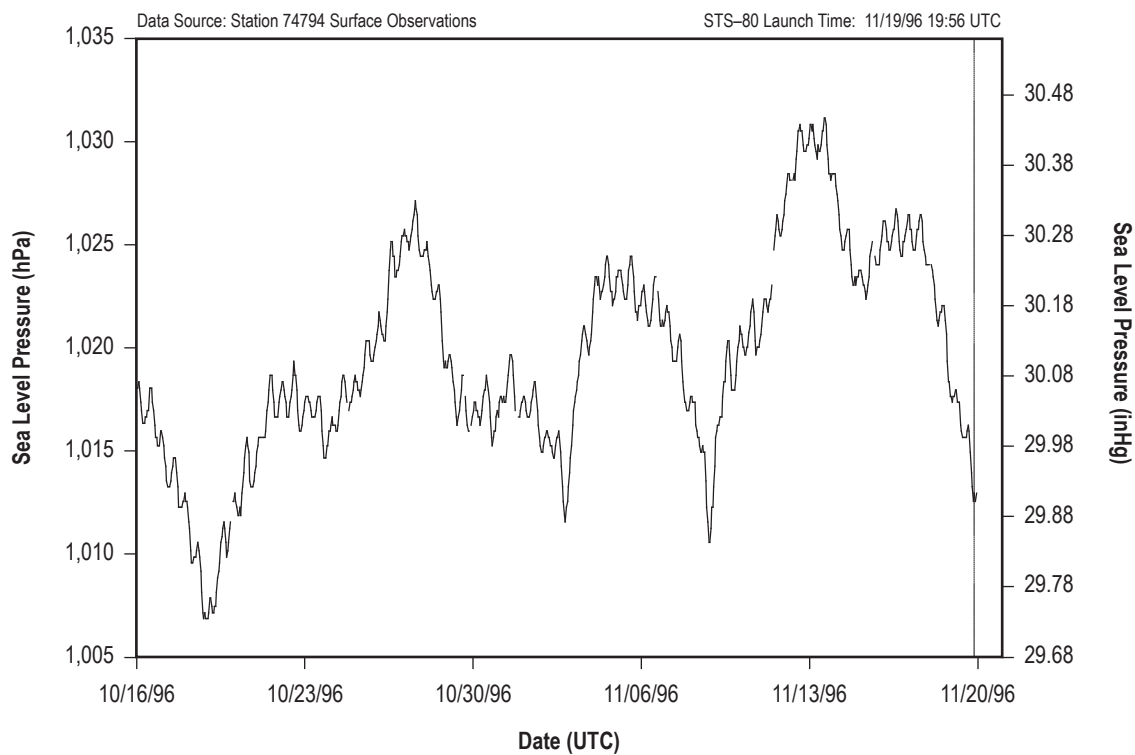


Figure 485. STS-80 hourly sea level pressure.

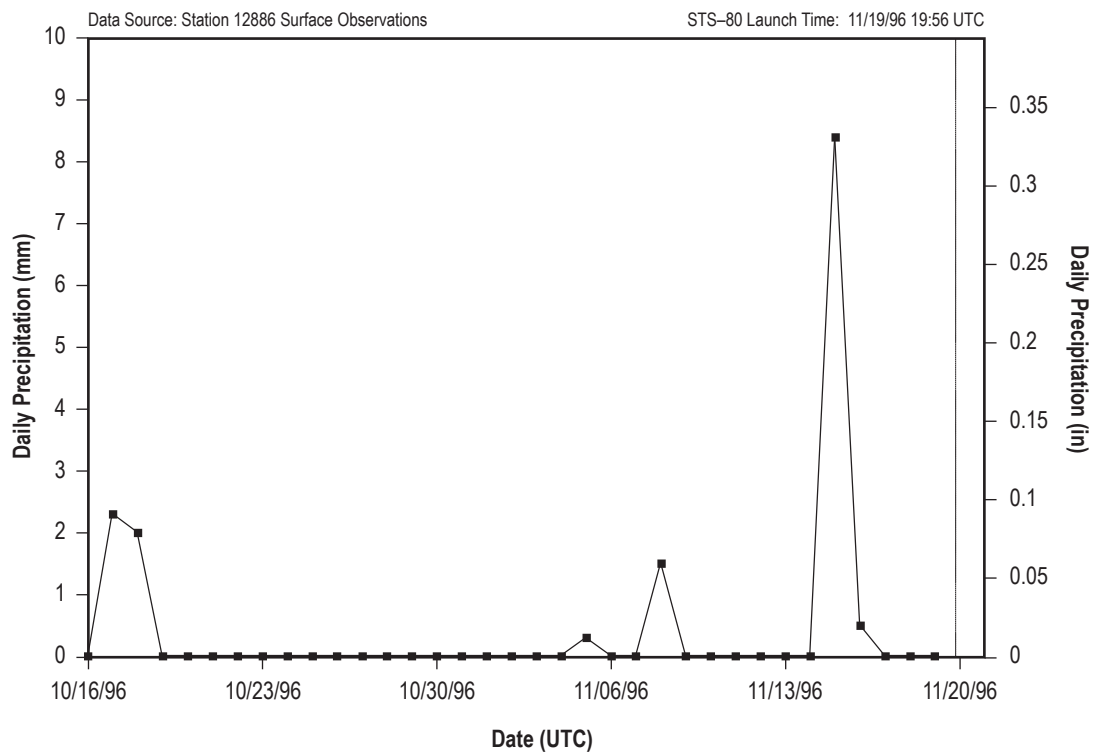


Figure 486. STS-80 daily precipitation totals.

## 5.81 STS-81

STS-81 was the 18th mission for *Atlantis* (OV-104). It rolled out to pad 39B on December 10, 1996. STS-81 was exposed on the pad for 33 days and launched on January 12, 1997, at 09:27 UTC.

### 5.81.1 STS-81 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-81 exposure period. Surface observations from station 74794 were also archived for this mission.

### 5.81.2 STS-81 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-81 are shown in table 165. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 165. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 165. STS-81 L-0 surface observations.

Temperature	16.2 °C (61.1 °F)
Relative humidity	79%
Sea level pressure	1,020.1 hPa (30.12 inHg)
Wind speed	4.3 m/s (8.3 kt) (1-min average)
Wind direction	343° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi)

### 5.81.3 STS-81 Pad Exposure Period Hourly Meteorological Parameters

Figures 487–492 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-81 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 166. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure was measured at station 74794. Precipitation was measured at station 12886.

Table 166. STS-81 pad exposure period hourly extremes.

Minimum temperature	2.2 °C (36 °F)
Maximum temperature	27.2 °C (81 °F)
Minimum relative humidity	47%
Maximum relative humidity	100%
Minimum sea level pressure	1,006.8 hPa (29.73 inHg)
Maximum sea level pressure	1,029.8 hPa (30.41 inHg)
Maximum wind speed and associated wind direction	14.9 m/s (29 kt) 342°
Total precipitation	11.2 mm (0.44 in)

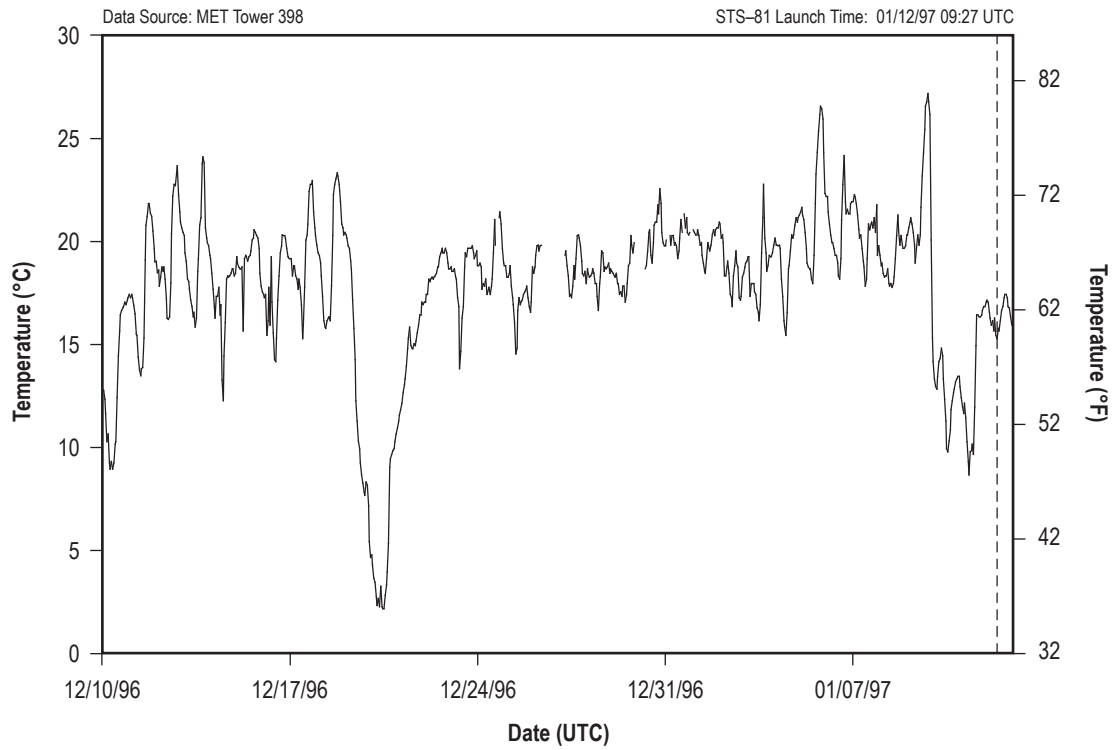


Figure 487. STS-81 hourly surface temperature.

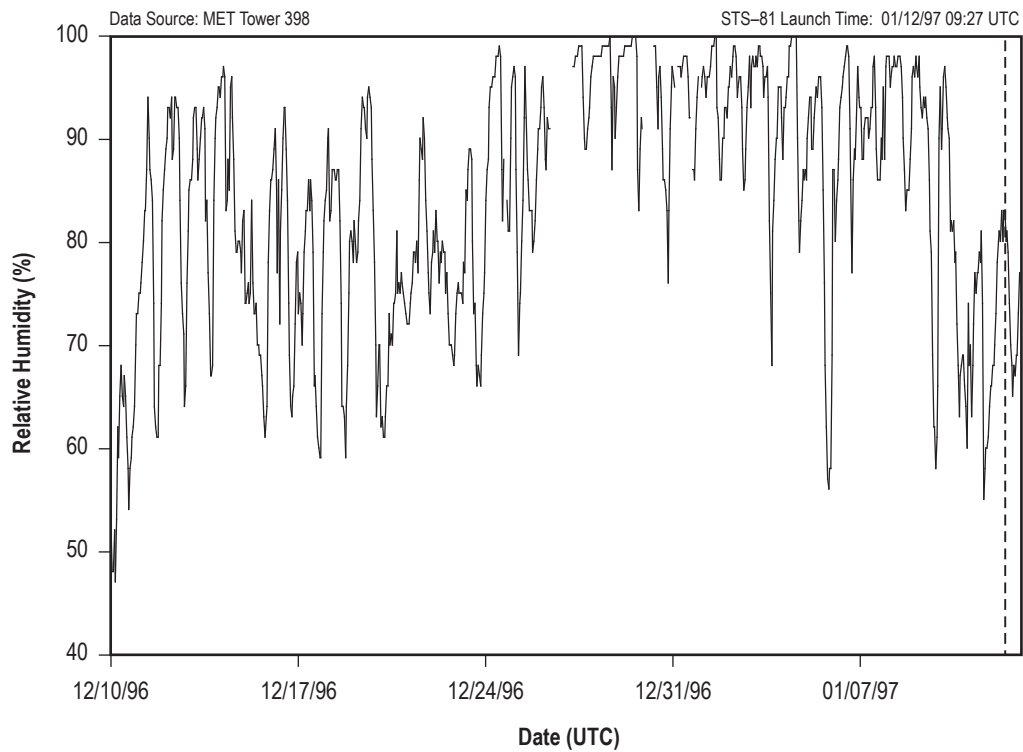


Figure 488. STS-81 hourly surface relative humidity.

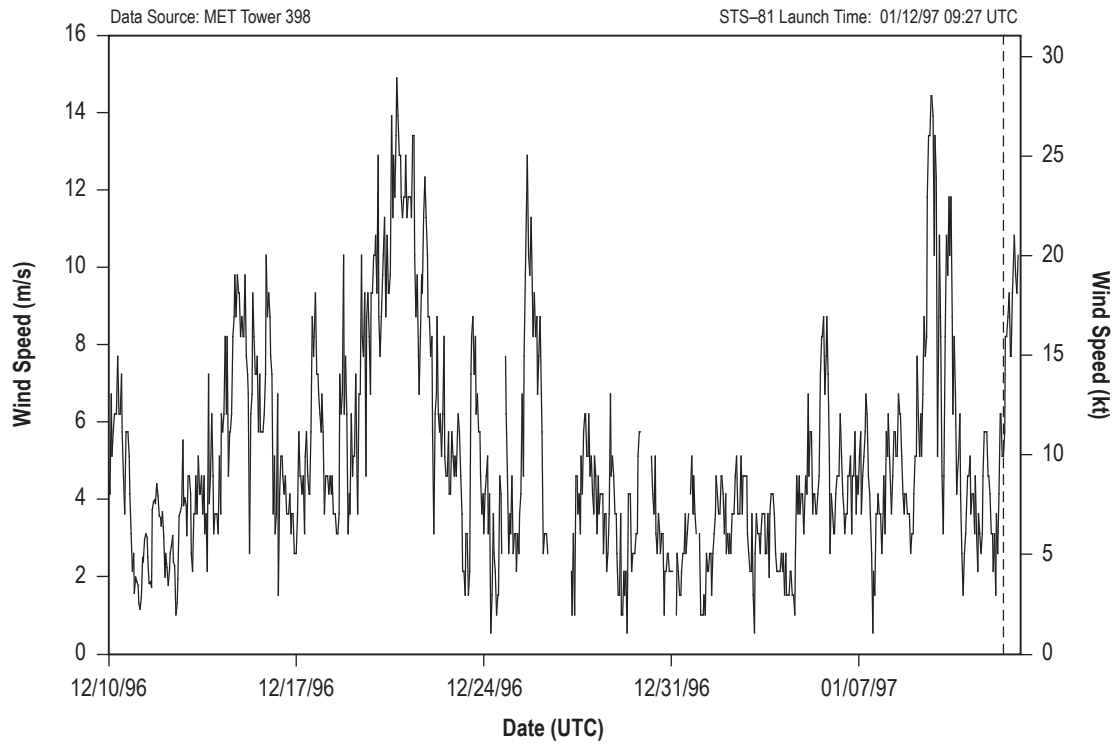


Figure 489. STS-81 hourly surface wind speed.

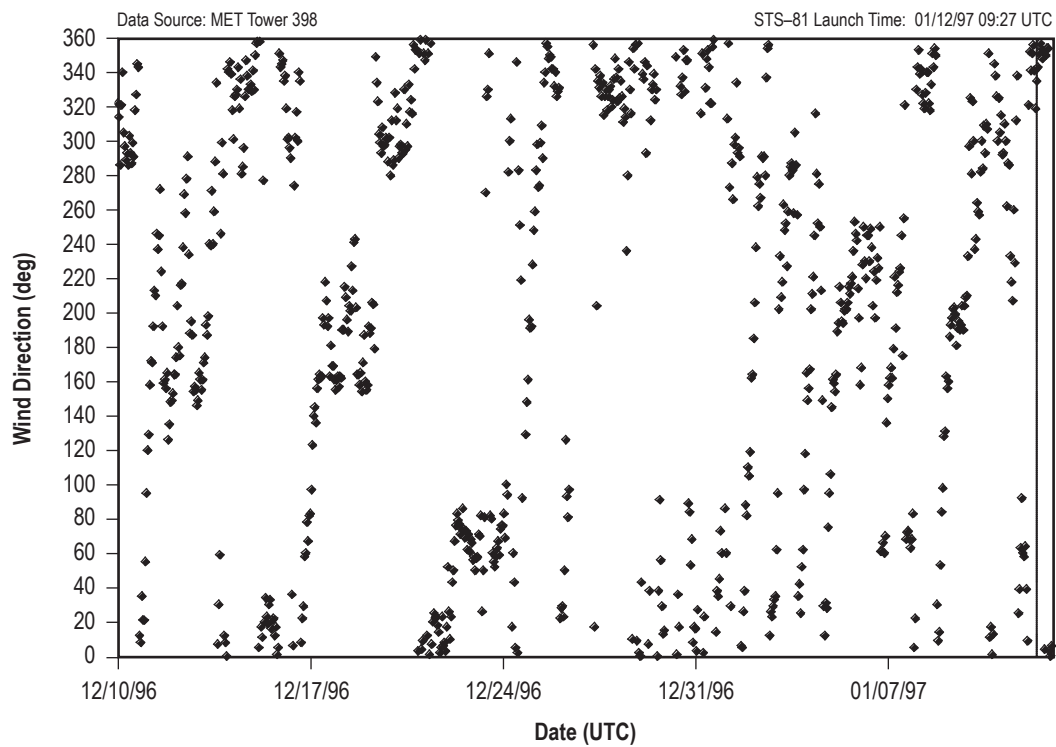


Figure 490. STS-81 hourly surface wind direction.

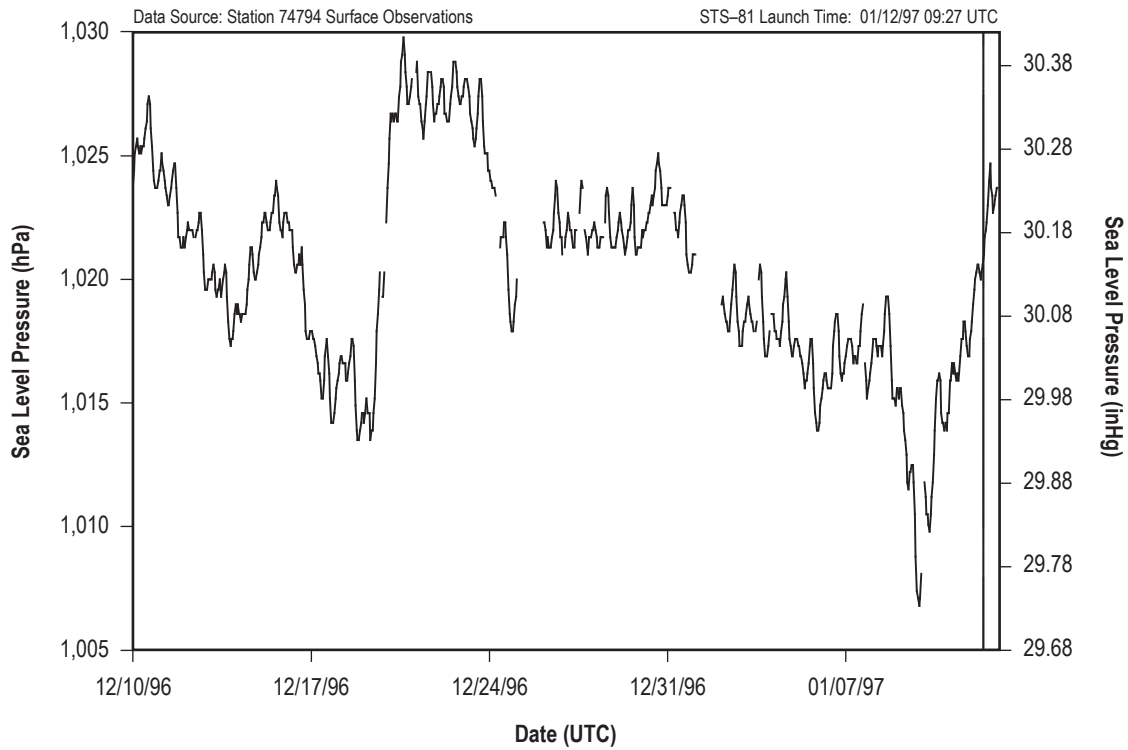


Figure 491. STS-81 hourly sea level pressure.

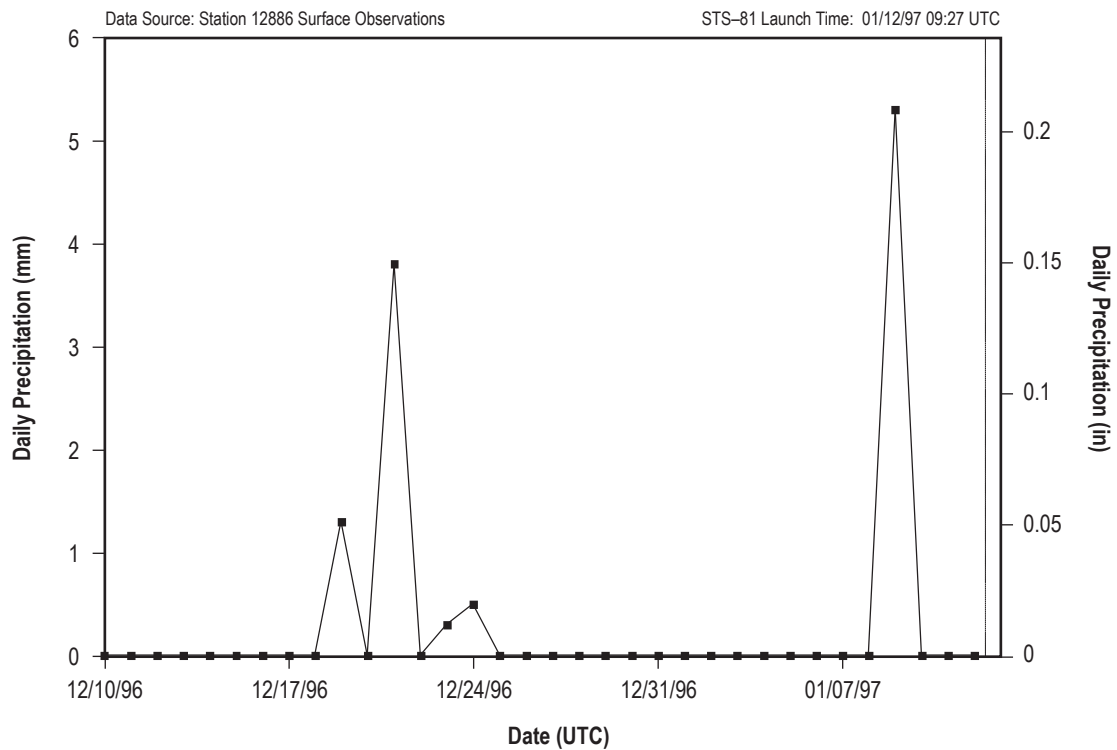


Figure 492. STS-81 daily precipitation totals.

## 5.82 STS–82

STS–82 was the 22d mission for *Discovery* (OV–103). It rolled out to pad 39A on January 17, 1997. STS–82 was exposed on the pad for 25 days and launched on February 11, 1997, at 08:55 UTC.

### 5.82.1 STS–82 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–82 exposure period. Additionally, pressure data from MET towers 394 and 398 have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.82.2 STS–82 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–82 are shown in table 167. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 167. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 167. STS–82 L–0 surface observations.

Temperature	11.1 °C (52 °F)
Relative humidity	94%
Sea level pressure	1,021.4 hPa (30.16 inHg)
Wind speed	3.3 m/s (6.4 kt) (1-min average)
Wind direction	299° (1-min average)
Sky condition	1/8 cumulus at 366 m (1,200 ft); 1/8 stratocumulus at 975 m (3,200 ft)
Visibility	12.9 km (6.9 nmi)

### 5.82.3 STS–82 Pad Exposure Period Hourly Meteorological Parameters

Figures 493–498 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–82 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 168. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure data were also measured at MET tower 394. Precipitation was measured at station 12886.

Table 168. STS–82 pad exposure period hourly extremes.

Minimum temperature	0.6 °C (33 °F)
Maximum temperature	26.1 °C (79 °F)
Minimum relative humidity	25%
Maximum relative humidity	100%
Minimum sea level pressure	1,014.5 hPa (29.96 inHg)
Maximum sea level pressure	1,029.8 hPa (30.41 inHg)
Maximum wind speed and associated wind direction	16 m/s (31 kt) 348°
Total precipitation	11.2 mm (0.44 in)

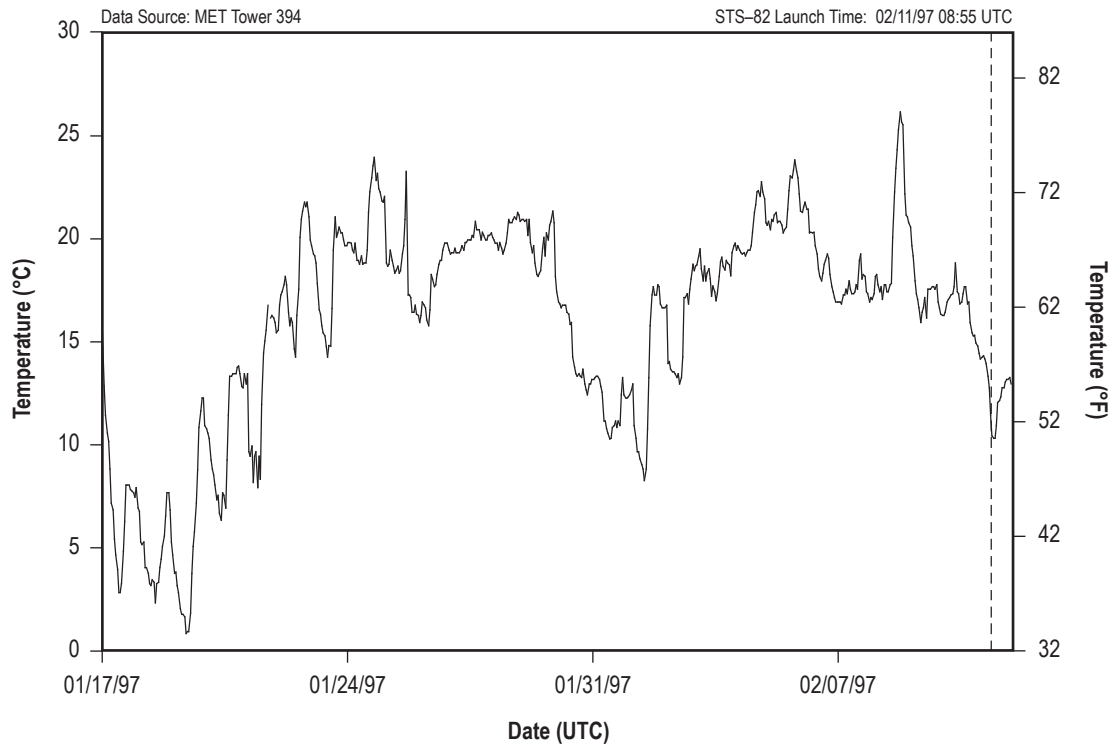


Figure 493. STS-82 hourly surface temperature.

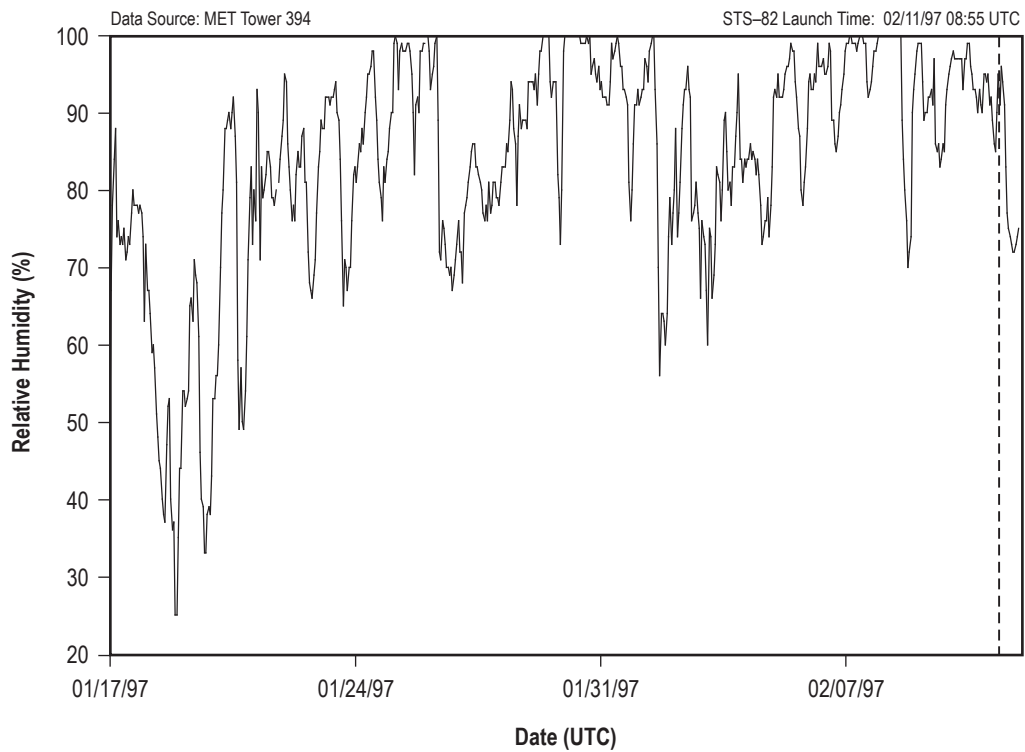


Figure 494. STS-82 hourly surface relative humidity.

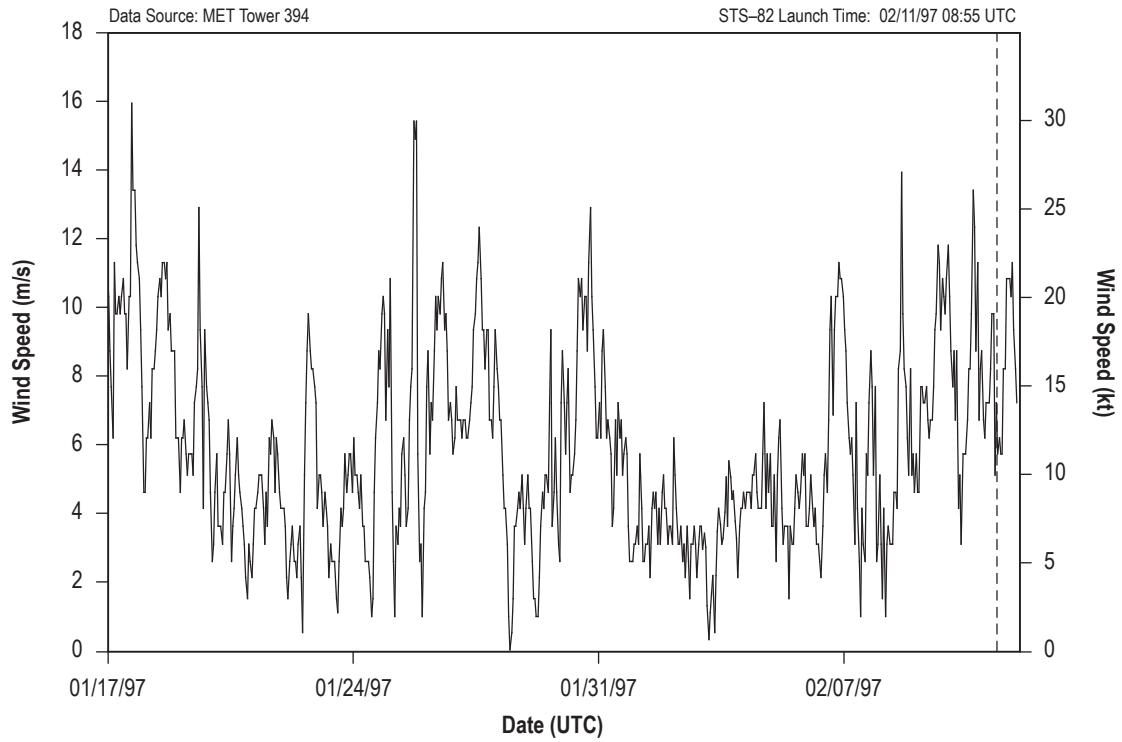


Figure 495. STS-82 hourly surface wind speed.

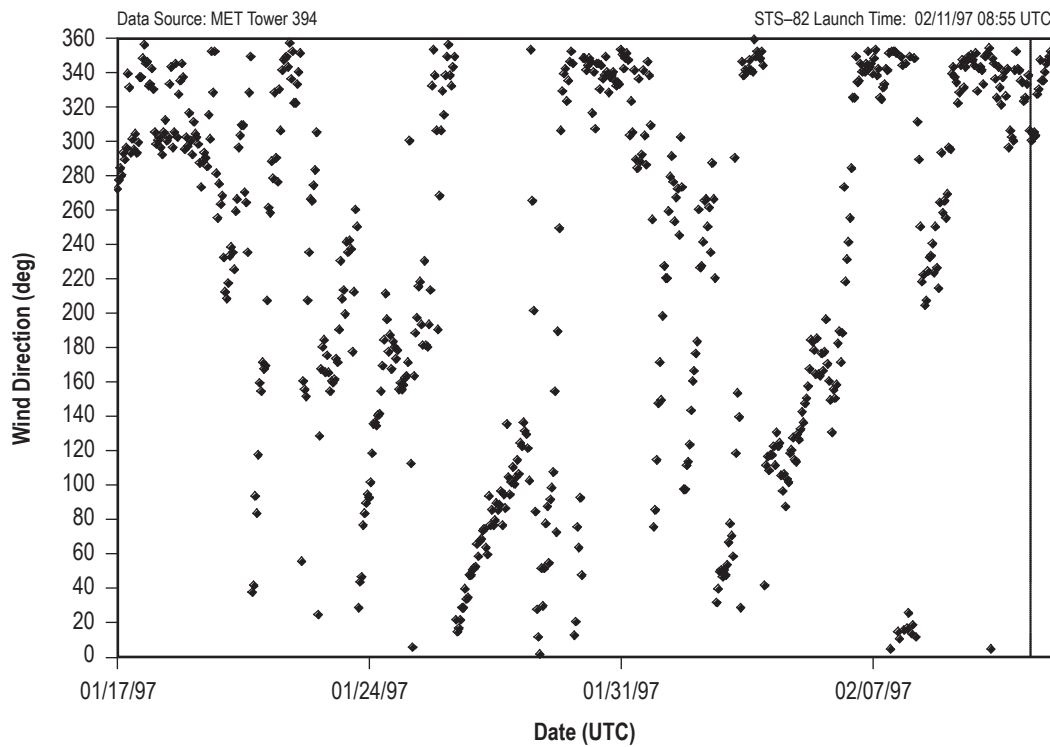


Figure 496. STS-82 hourly surface wind direction.



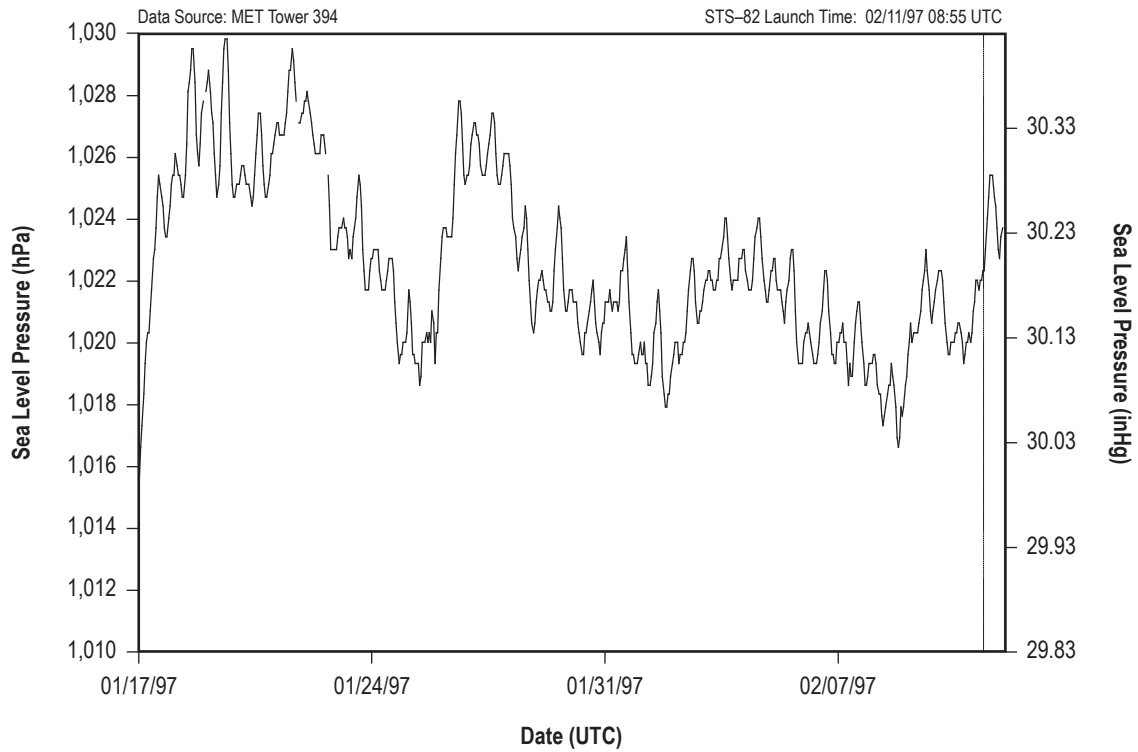


Figure 497. STS-82 hourly sea level pressure.

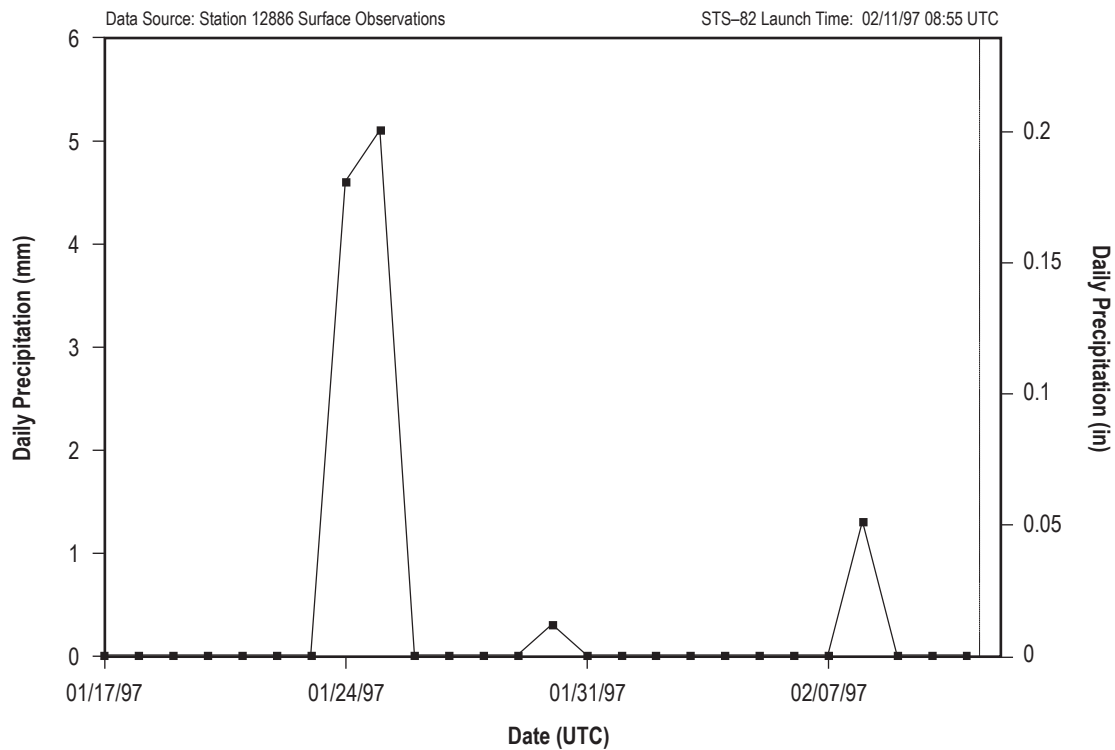


Figure 498. STS-82 daily precipitation totals.

## 5.83 STS–83

STS–83 was the 22d mission for *Columbia* (OV–102). It rolled out to pad 39A on March 11, 1997. STS–83 was exposed on the pad for 25 days and launched on April 4, 1997, at 19:21 UTC.

### 5.83.1 STS–83 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–83 exposure period. Additionally, pressure data from MET towers 394 and 398 have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.83.2 STS–83 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–83 are shown in table 169. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 169. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 169. STS–83 L–0 surface observations.

Temperature	23.7 °C (74.6 °F)
Relative humidity	50%
Sea level pressure	1,021.4 hPa (30.16 inHg)
Wind speed	4.5 m/s (8.8 kt) (1-min average)
Wind direction	127° (1-min average)
Sky condition	1/8 stratocumulus at 1,676 m (5,500 ft); 1/8 cirrostratus at 8,839 m (29,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.83.3 STS–83 Pad Exposure Period Hourly Meteorological Parameters

Figures 499–504 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–83 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 170. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure data were also measured at MET tower 394. Precipitation was measured at station 12886.

Table 170. STS–83 pad exposure period hourly extremes.

Minimum temperature	12.2 °C (54 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	39%
Maximum relative humidity	100%
Minimum sea level pressure	1,005.4 hPa (29.69 inHg)
Maximum sea level pressure	1,027.1 hPa (30.33 inHg)
Maximum wind speed and associated wind direction	17.5 m/s (34 kt) 351°
Total precipitation	70.4 mm (2.77 in)

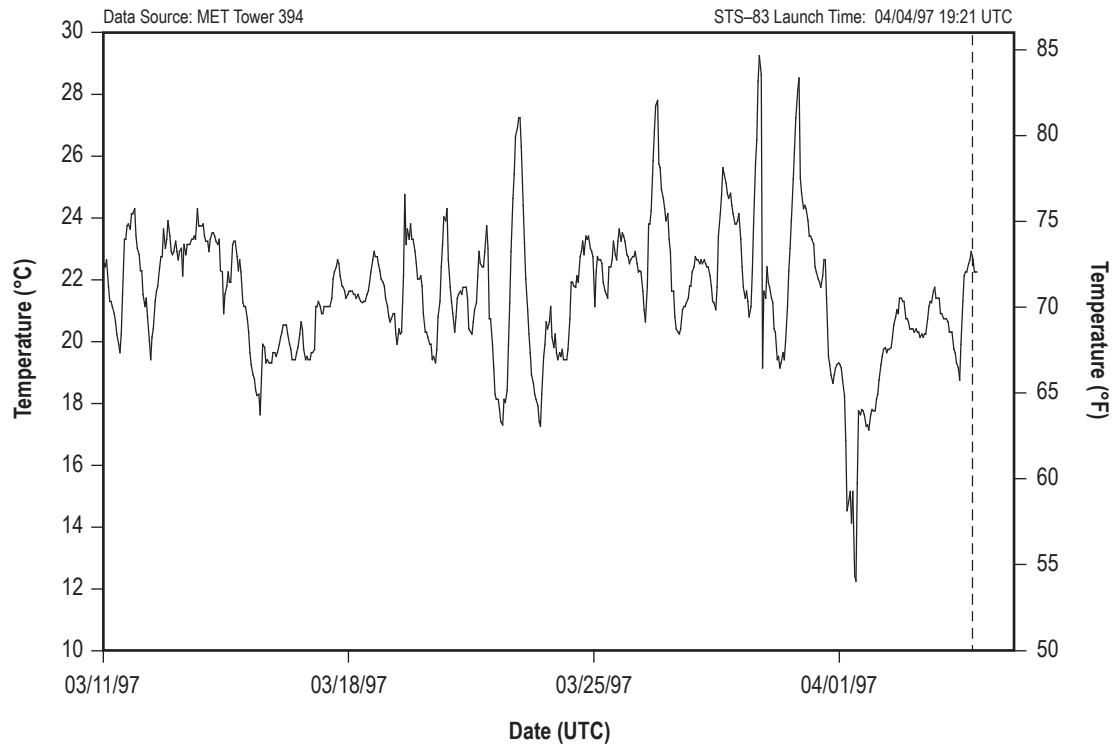


Figure 499. STS-83 hourly surface temperature.

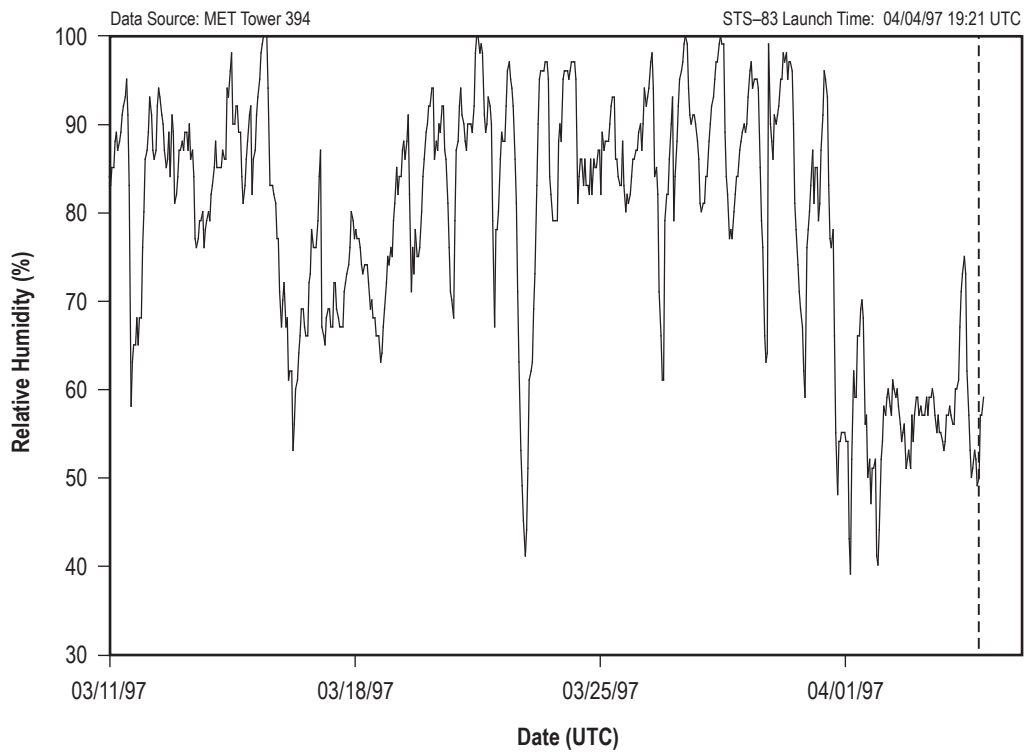


Figure 500. STS-83 hourly surface relative humidity.

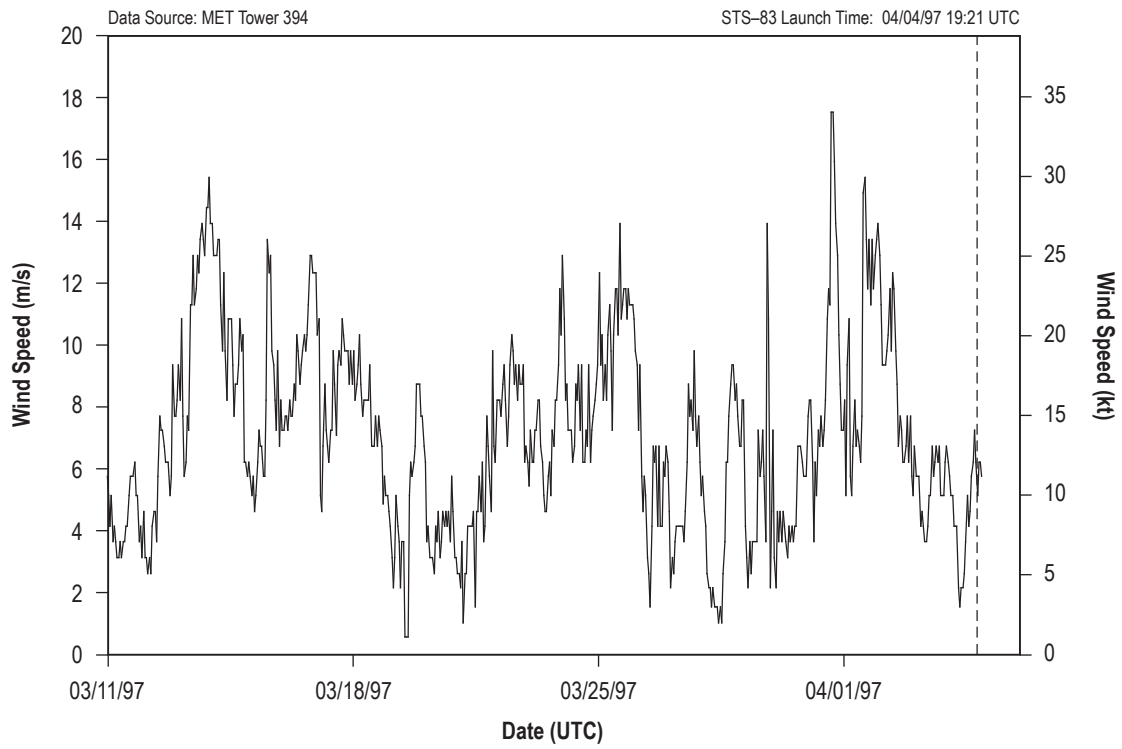


Figure 501. STS-83 hourly surface wind speed.

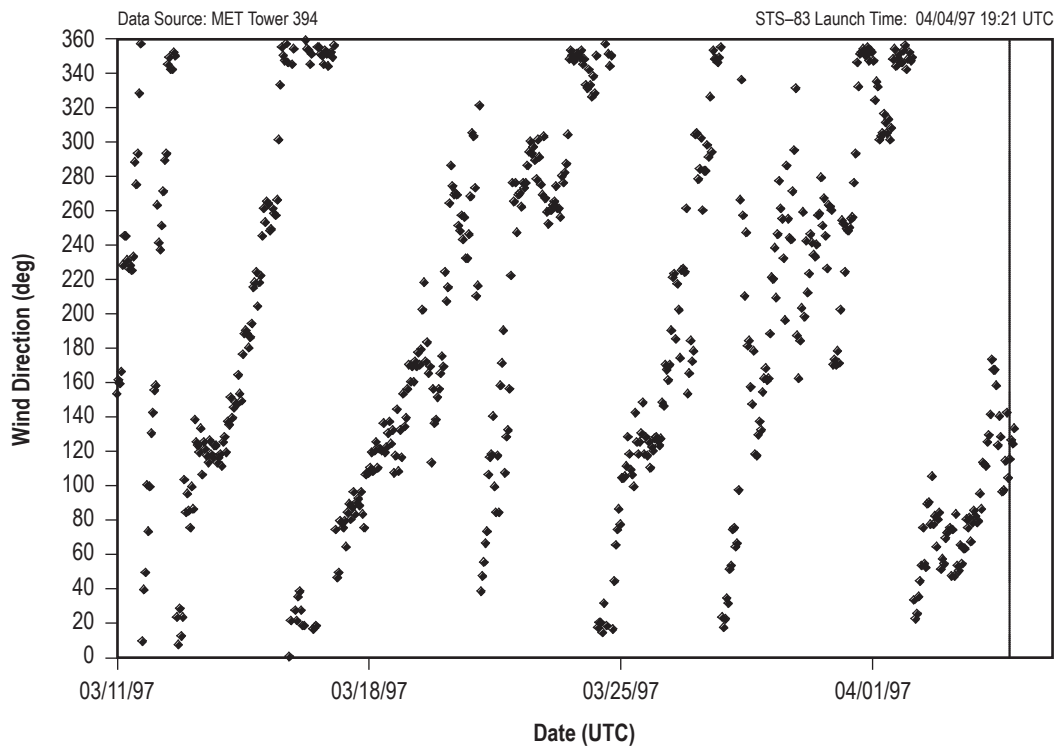


Figure 502. STS-83 hourly surface wind direction.

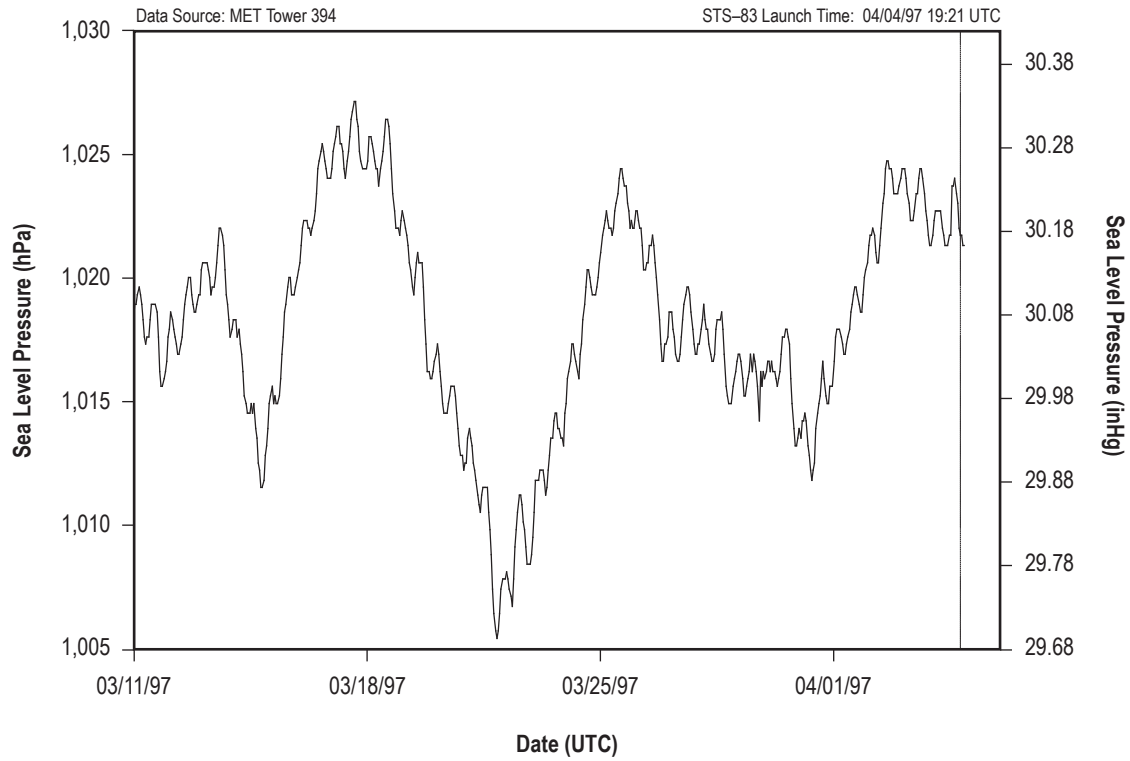


Figure 503. STS-83 hourly sea level pressure.

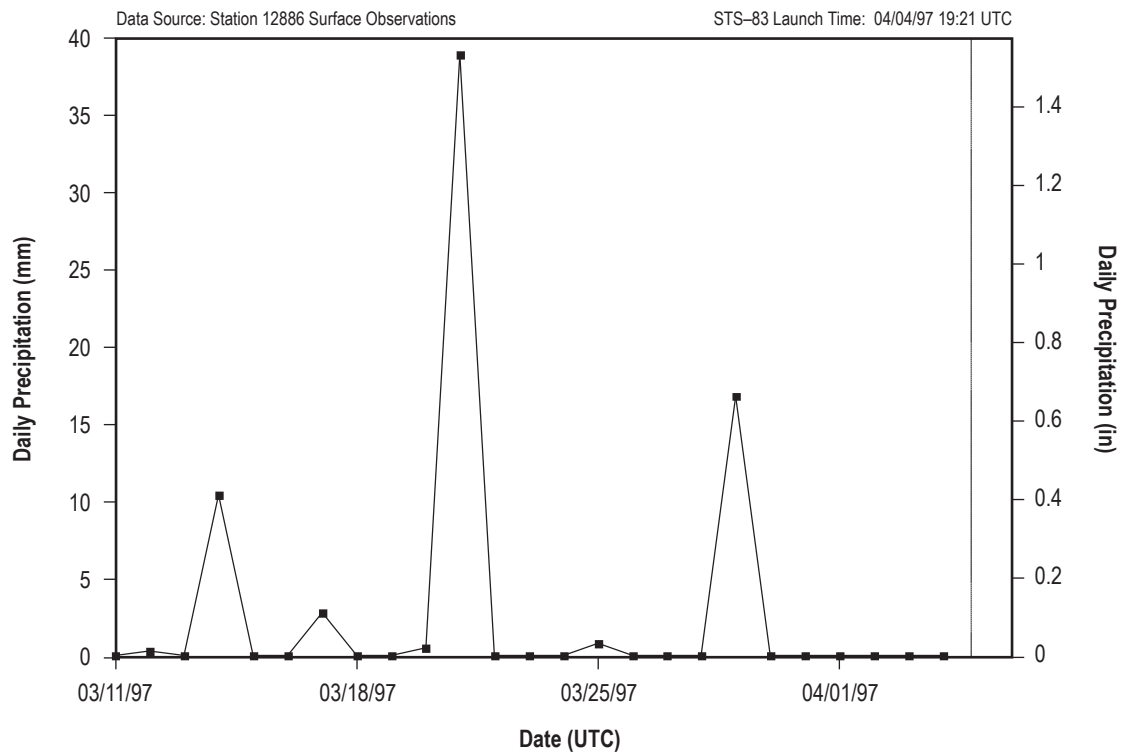


Figure 504. STS-83 daily precipitation totals.

## 5.84 STS-84

STS-84 was the 19th mission for *Atlantis* (OV-104). It rolled out to pad 39A on April 24, 1997. STS-84 was exposed on the pad for 21 days and launched on May 15, 1997, at 08:08 UTC.

### 5.84.1 STS-84 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-84 exposure period. Additionally, pressure data from MET towers 394 and 398 have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.84.2 STS-84 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-84 are shown in table 171. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 171. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 171. STS-84 L-0 surface observations.

Temperature	21.2 °C (70.2 °F)
Relative humidity	82%
Sea level pressure	1,015.3 hPa (29.98 inHg)
Wind speed	2.5 m/s (4.9 kt) (1-min average)
Wind direction	300° (1-min average)
Sky condition	Clear skies
Visibility	14.5 km (7.8 nmi)

### 5.84.3 STS-84 Pad Exposure Period Hourly Meteorological Parameters

Figures 505–510 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-84 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 172. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure data were also measured at MET tower 394. Precipitation was measured at station 12886.

Table 172. STS-84 pad exposure period hourly extremes.

Minimum temperature	15 °C (59 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	49%
Maximum relative humidity	100%
Minimum sea level pressure	1,001.7 hPa (29.58 inHg)
Maximum sea level pressure	1,025.1 hPa (30.27 inHg)
Maximum wind speed and associated wind direction	19 m/s (37 kt) 244°
Total precipitation	59.2 mm (2.33 in)

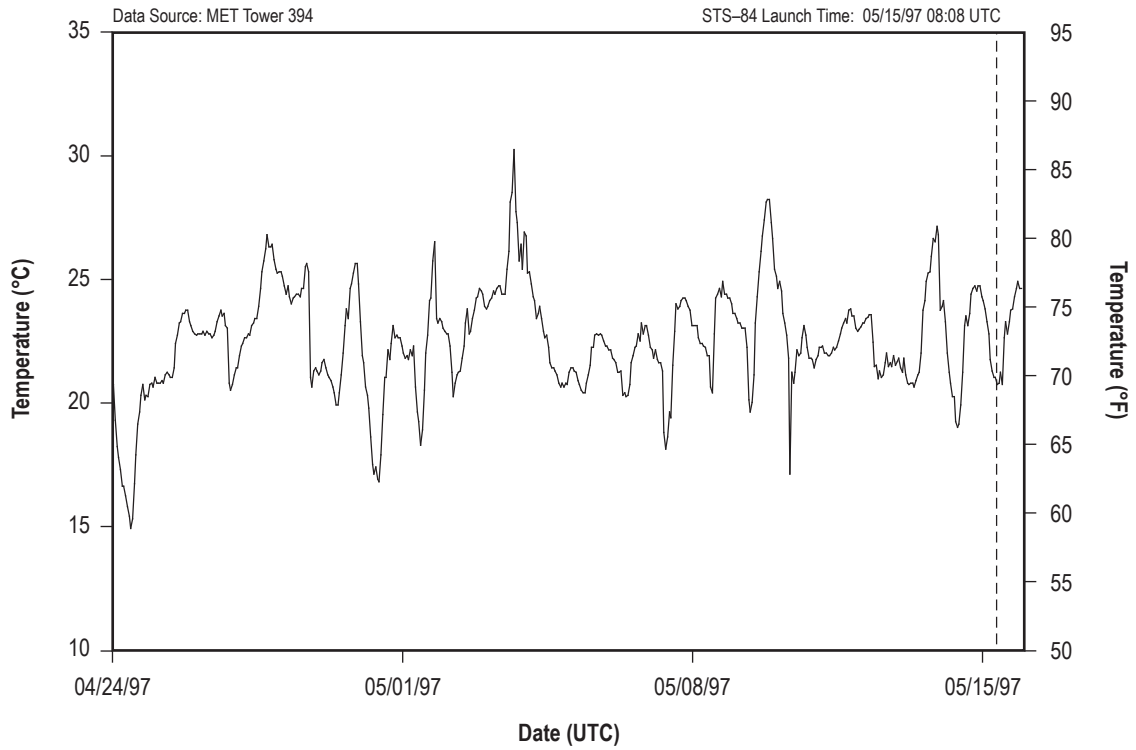


Figure 505. STS-84 hourly surface temperature.

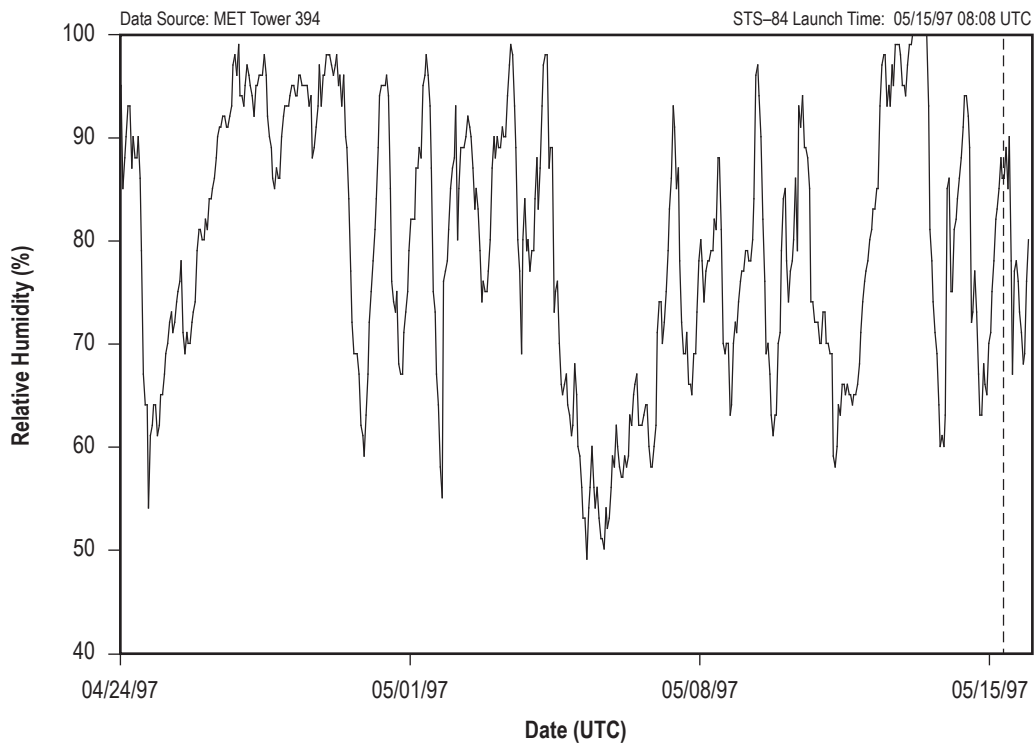


Figure 506. STS-84 hourly surface relative humidity.

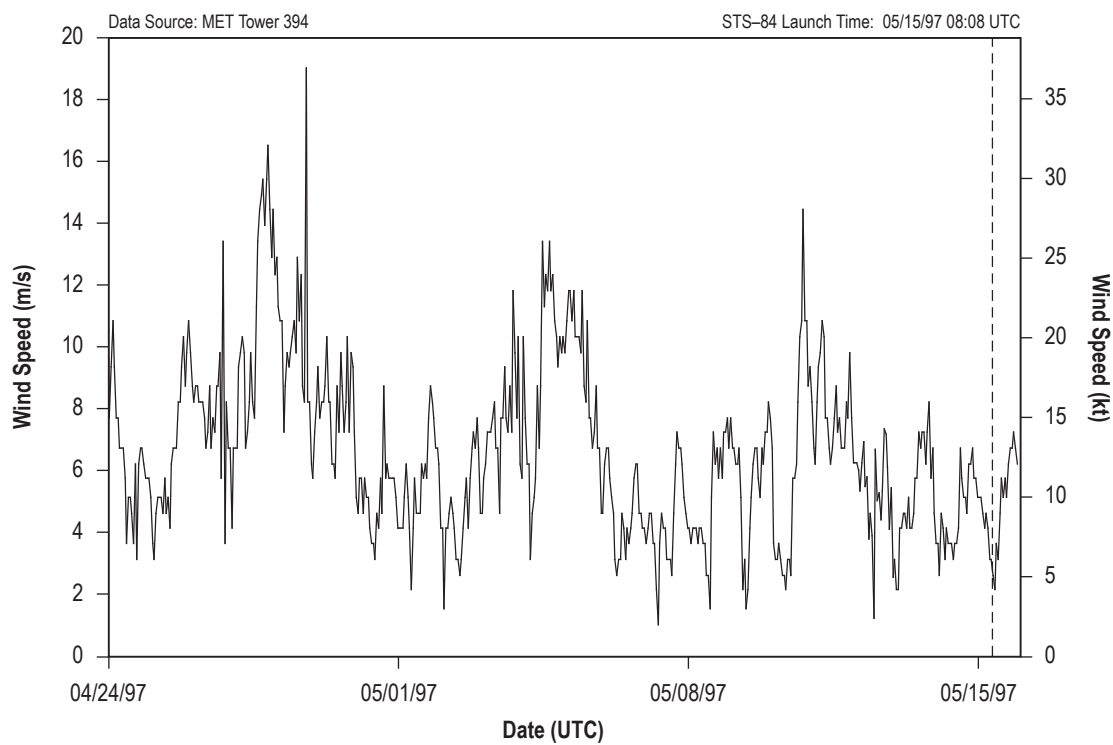


Figure 507. STS-84 hourly surface wind speed.

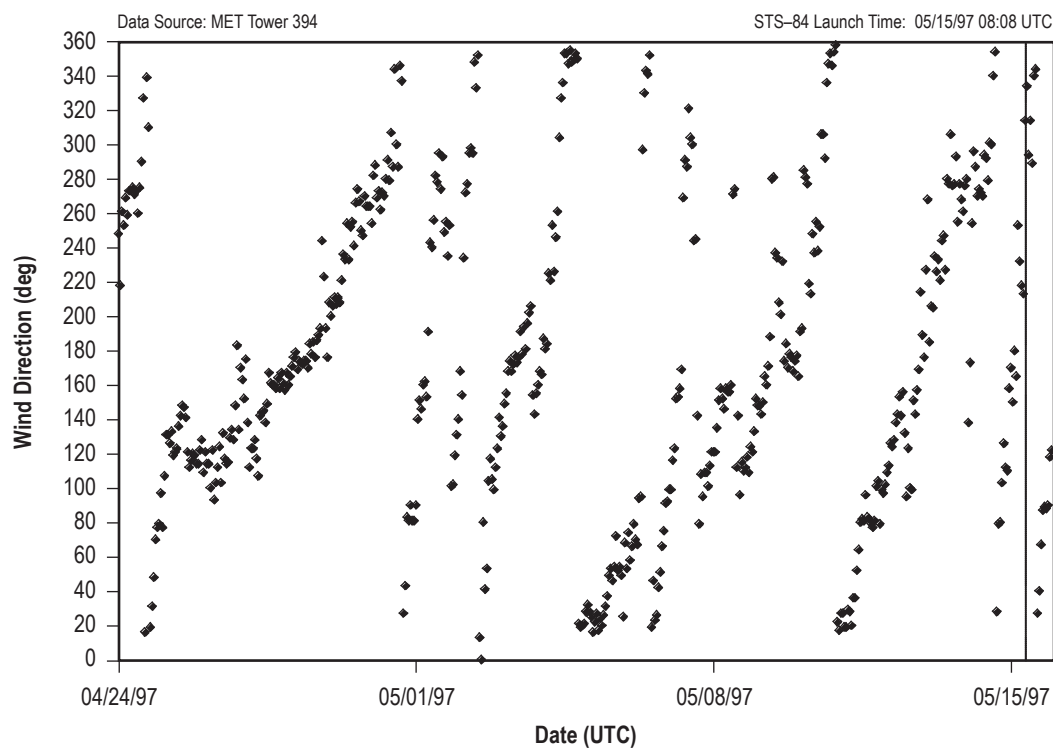


Figure 508. STS-84 hourly surface wind direction.



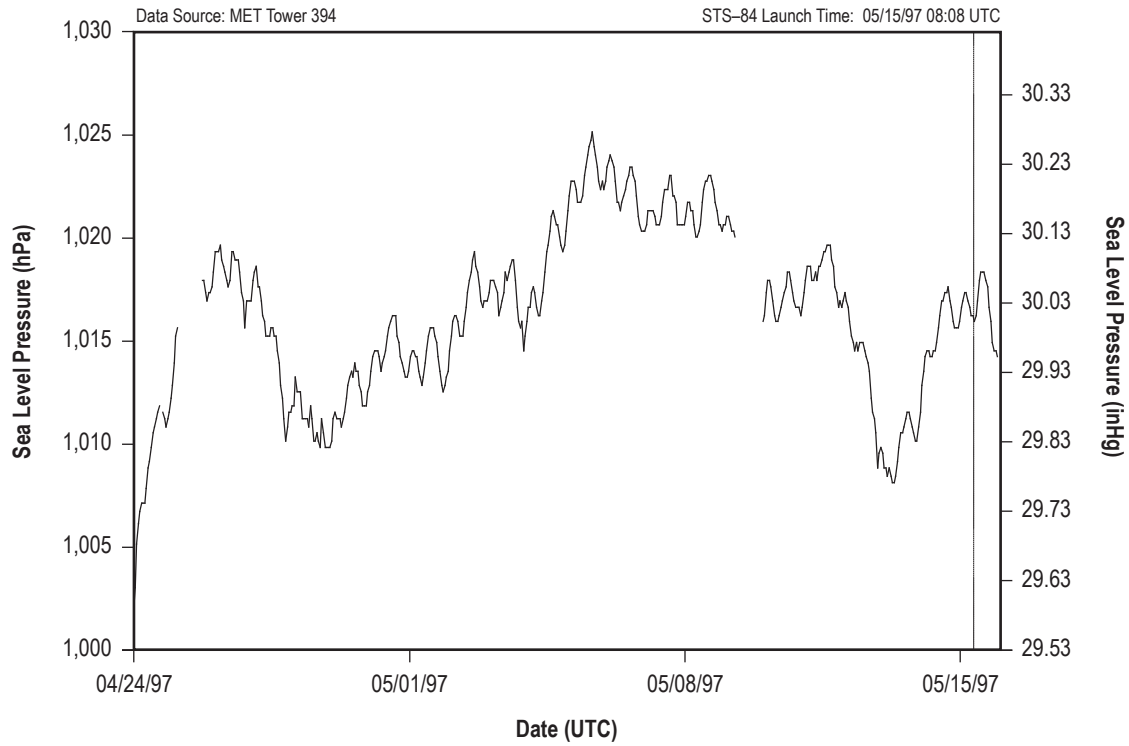


Figure 509. STS-84 hourly sea level pressure.

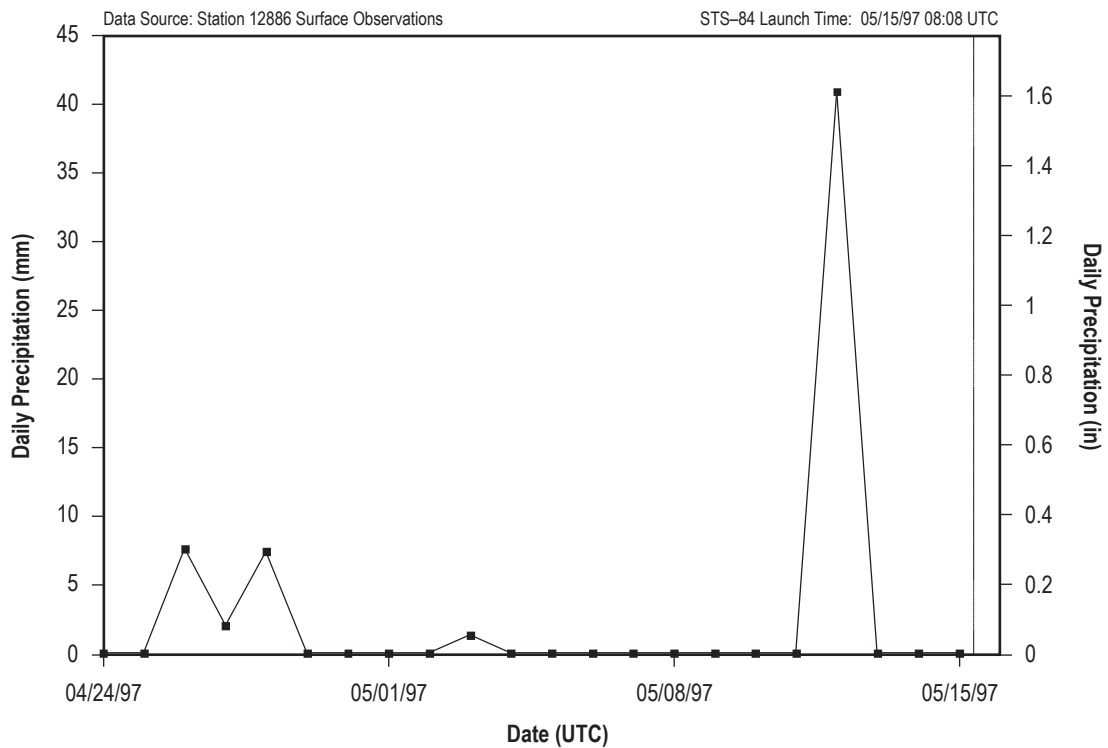


Figure 510. STS-84 daily precipitation totals.

## 5.85 STS-94

STS-94 was the 23d mission for *Columbia* (OV-102). It rolled out to pad 39A on June 11, 1997. STS-94 was exposed on the pad for 21 days and launched on July 1, 1997, at 18:02 UTC.

### 5.85.1 STS-94 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-94 exposure period. Additionally, pressure data from MET towers 394 and 398 have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.85.2 STS-94 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-94 are shown in table 173. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 173. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 173. STS-94 L-0 surface observations.

Temperature	28.7 °C (83.6 °F)
Relative humidity	74%
Sea level pressure	1,014 hPa (29.94 inHg)
Wind speed	4.6 m/s (9 kt) (1-min average)
Wind direction	35° (1-min average)
Sky condition	3/8 cumulonimbus at 1,067 m (3,500 ft); 1/8 altocumulus at 3,048 m (10,000 ft); 3/8 cirrostratus at 8,230 m (27,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.85.3 STS-94 Pad Exposure Period Hourly Meteorological Parameters

Figures 511–516 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-94 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 174. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure data were also measured at MET tower 394. Precipitation was measured at station 12886.

Table 174. STS-94 pad exposure period hourly extremes.

Minimum temperature	22.2 °C (72 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	45%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.5 hPa (29.81 inHg)
Maximum sea level pressure	1,021.3 hPa (30.16 inHg)
Maximum wind speed and associated wind direction	13.9 m/s (27 kt) 289°
Total precipitation	168.9 mm (6.65 in)

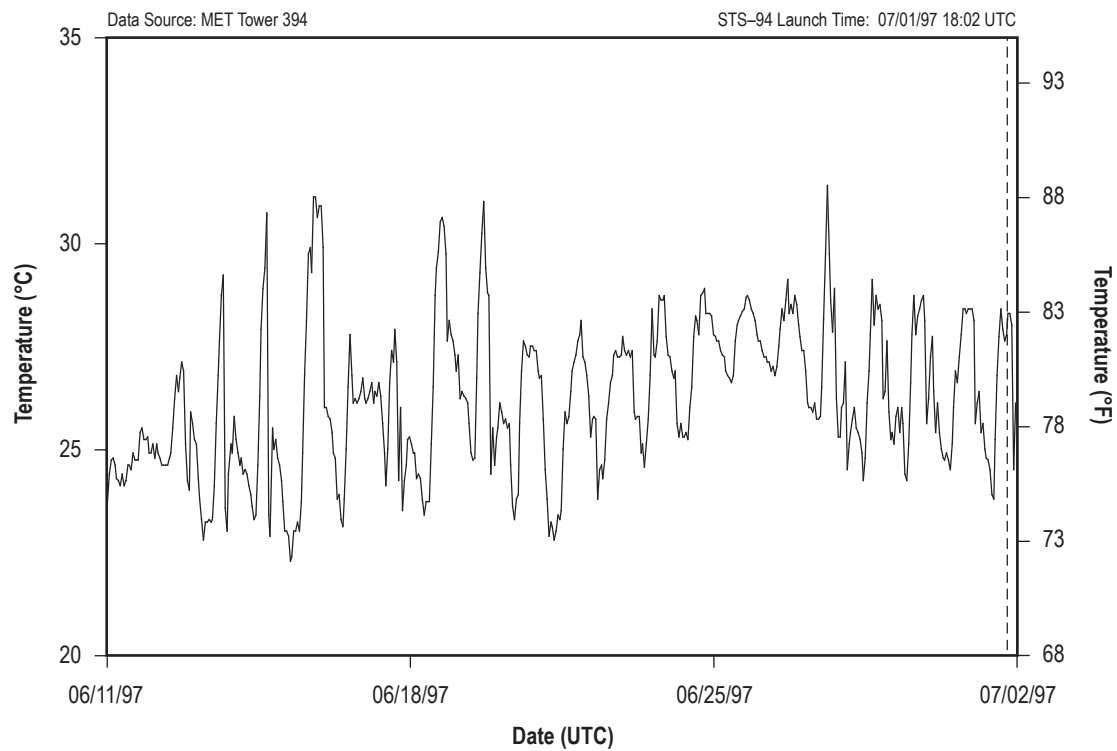


Figure 511. STS-94 hourly surface temperature.

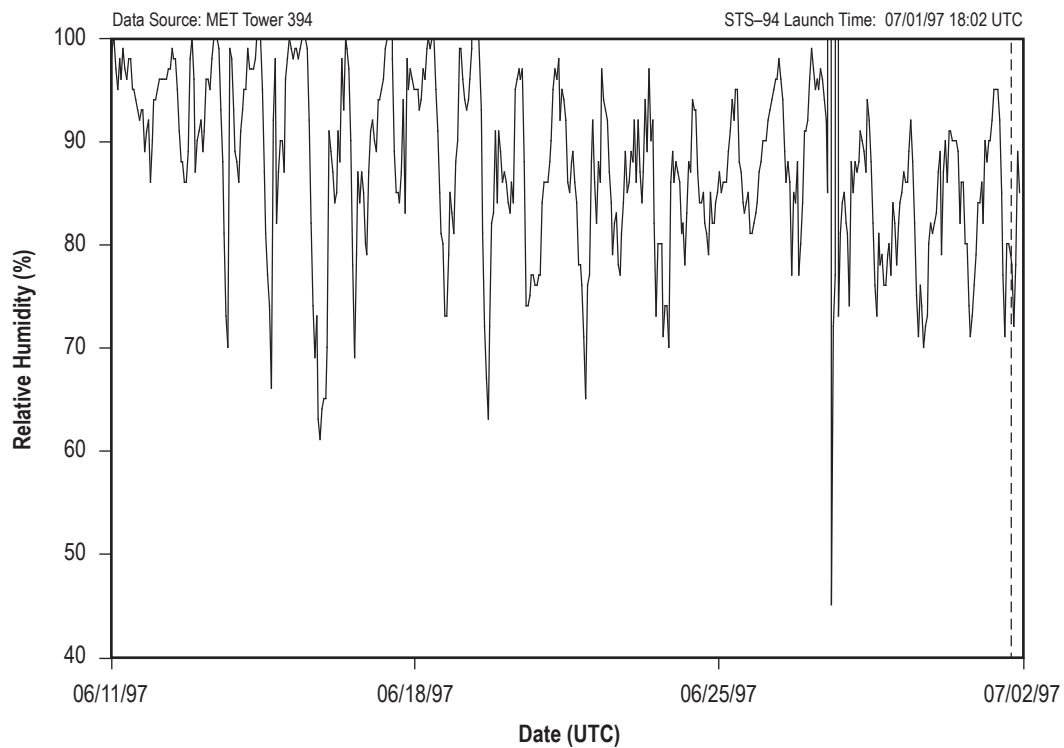


Figure 512. STS-94 hourly surface relative humidity.

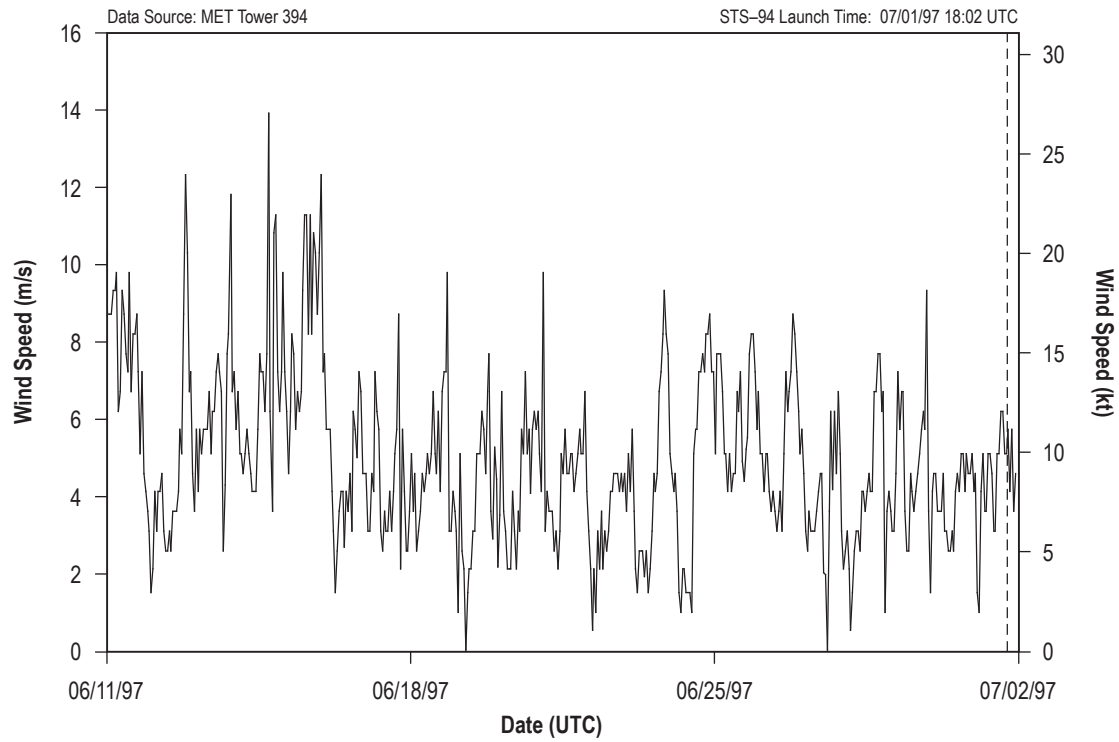


Figure 513. STS-94 hourly surface wind speed.

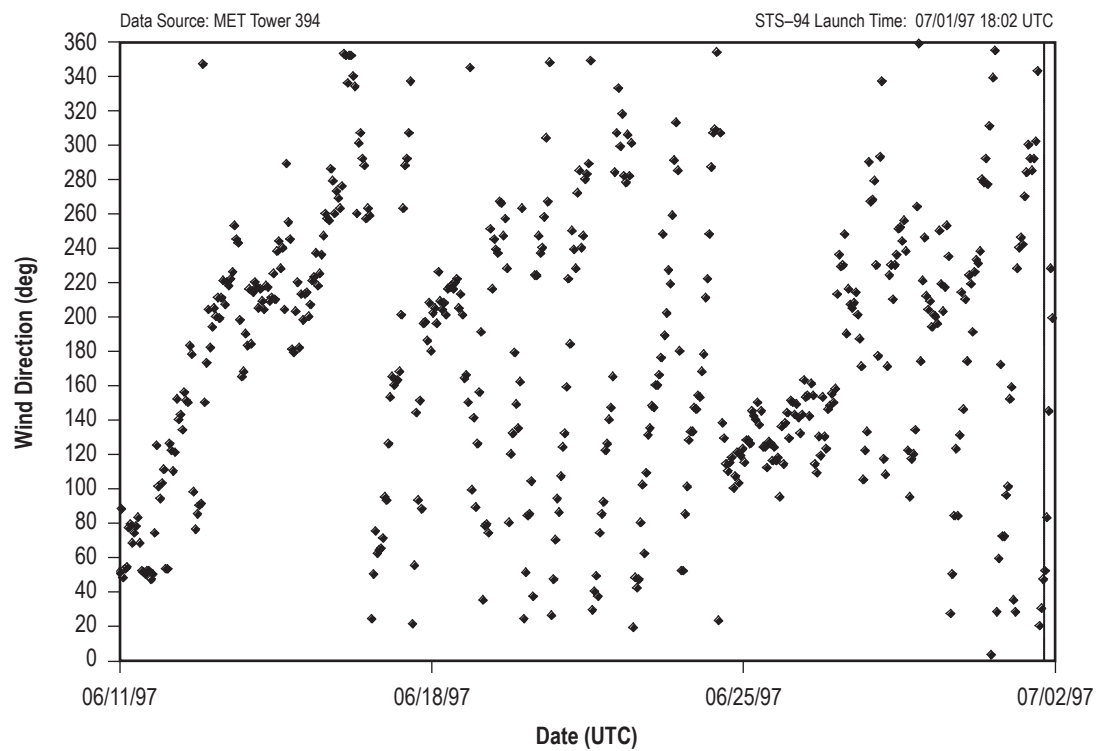


Figure 514. STS-94 hourly surface wind direction.

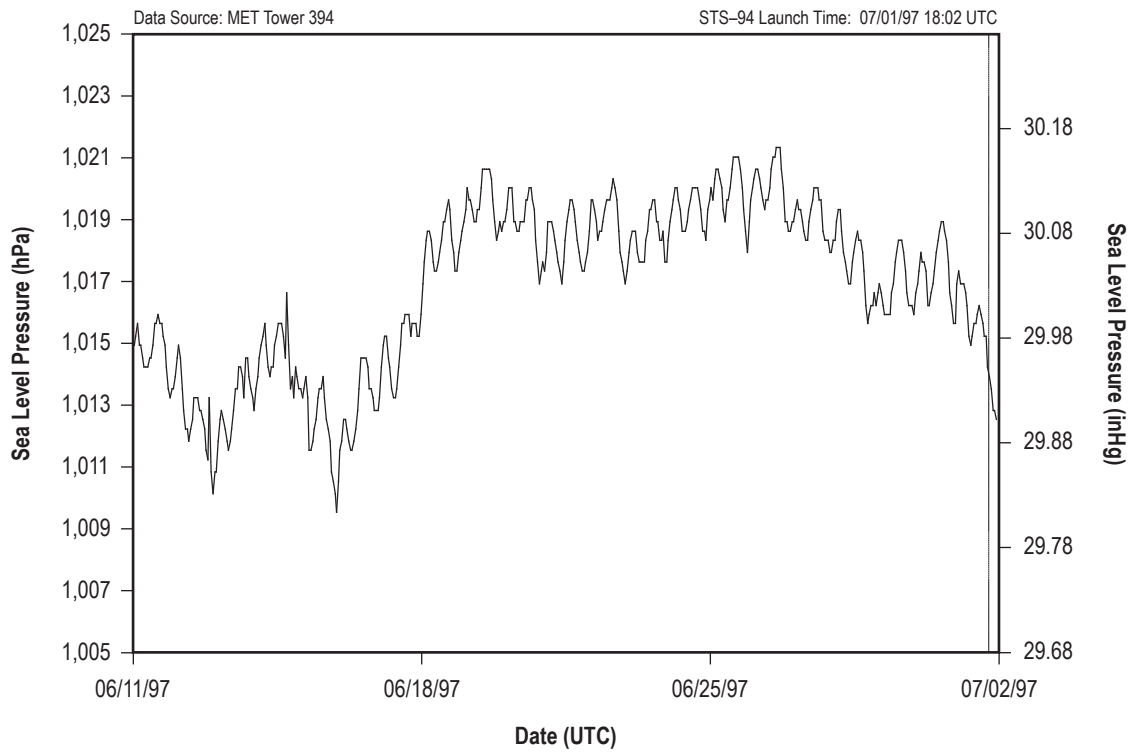


Figure 515. STS-94 hourly sea level pressure.

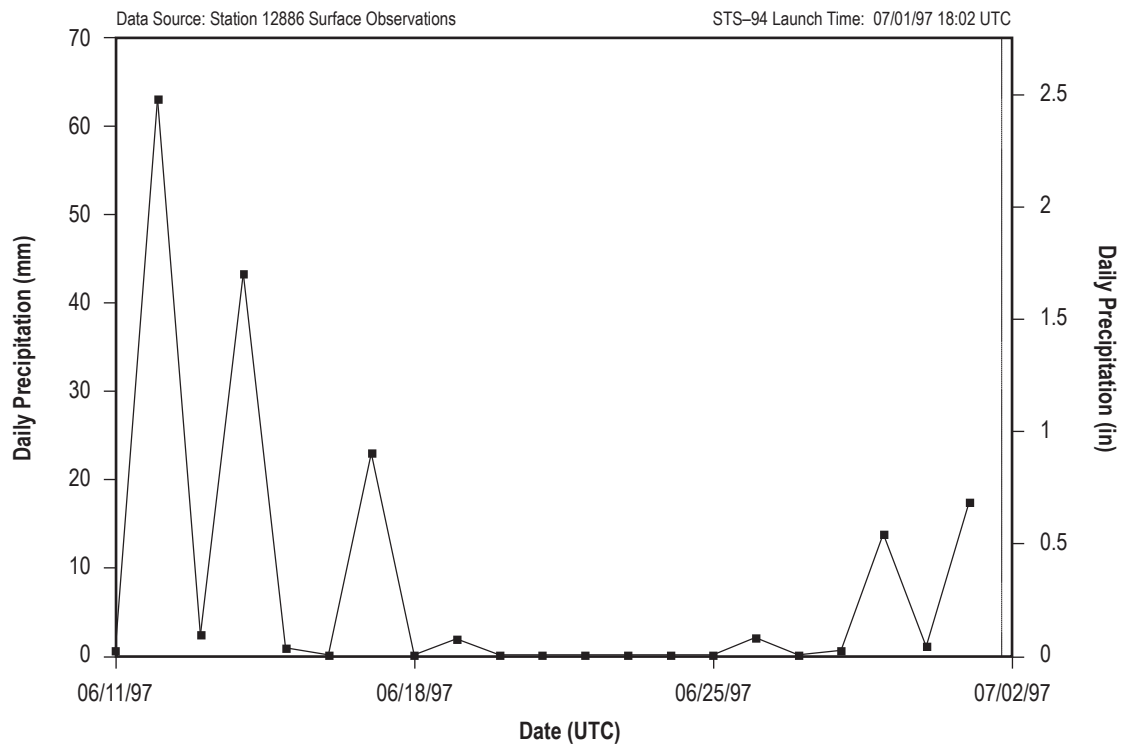


Figure 516. STS-94 daily precipitation totals.

## 5.86 STS–85

STS–85 was the 23d mission for *Discovery* (OV–103). It rolled out to pad 39A on July 14, 1997. STS–85 was exposed on the pad for 25 days and launched on August 7, 1997, at 14:41 UTC.

### 5.86.1 STS–85 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–85 exposure period. Additionally, pressure data from MET towers 394 and 398 have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.86.2 STS–85 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–85 are shown in table 175. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 175. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 175. STS–85 L–0 surface observations.

Temperature	28.3 °C (82.6 °F)
Relative humidity	81%
Sea level pressure	1,017.4 hPa (30.04 inHg)
Wind speed	2.8 m/s (5.4 kt) (1-min average)
Wind direction	20° (1-min average)
Sky condition	2/8 cumulus at 366 m (1,200 ft); 6/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	8 km (4.3 nmi)

### 5.86.3 STS–85 Pad Exposure Period Hourly Meteorological Parameters

Figures 517–522 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–85 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 176. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure data were also measured at MET tower 394. Precipitation was measured at station 12886.

Table 176. STS–85 pad exposure period hourly extremes.

Minimum temperature	22.8 °C (73 °F)
Maximum temperature	31.1 °C (88 °F)
Minimum relative humidity	64%
Maximum relative humidity	98%
Minimum sea level pressure	1,012.8 hPa (29.91 inHg)
Maximum sea level pressure	1,020.6 hPa (30.14 inHg)
Maximum wind speed and associated wind direction	13.9 m/s (27 kt) 194°
Total precipitation	150.9 mm (5.94 in)

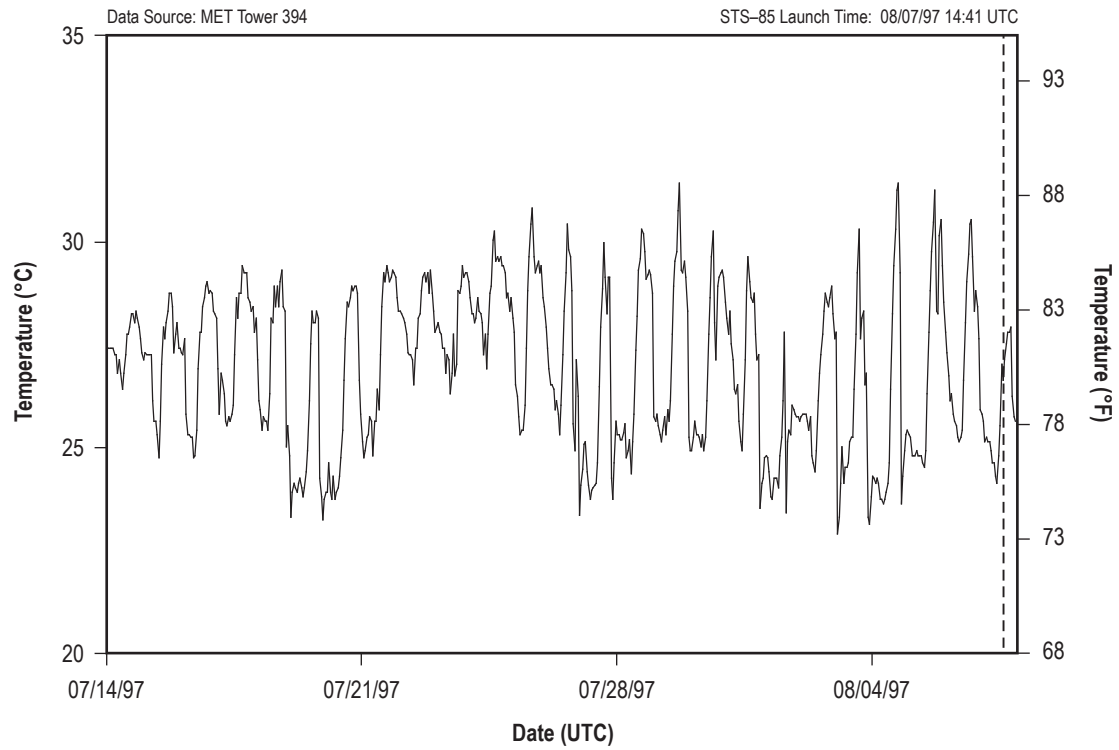


Figure 517. STS-85 hourly surface temperature.

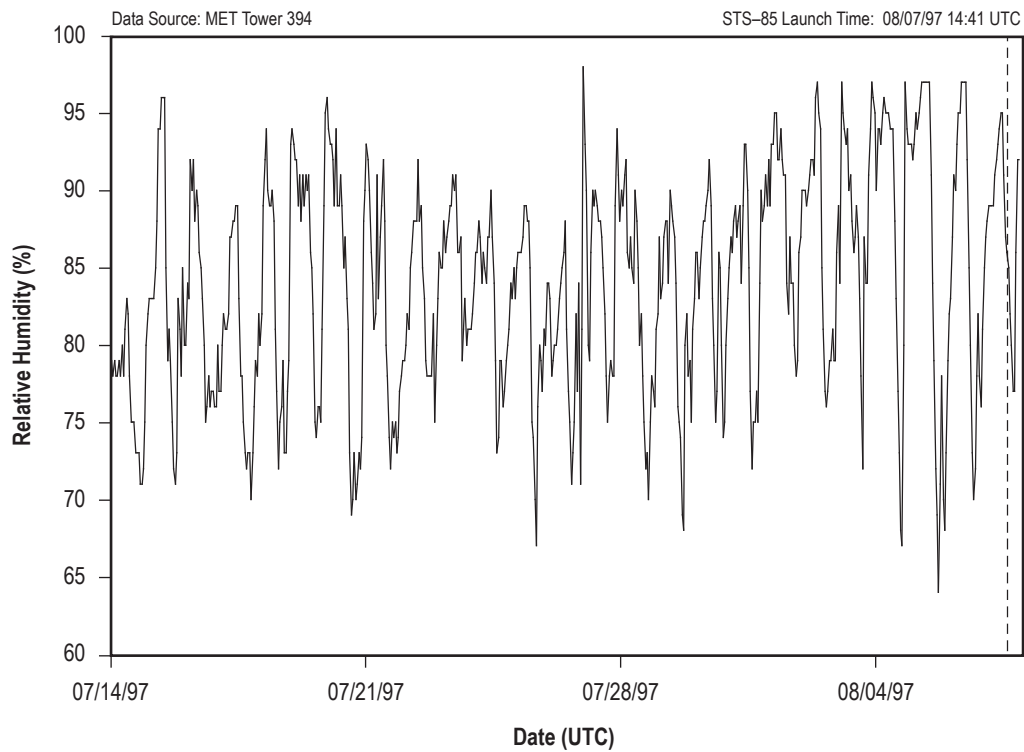


Figure 518. STS-85 hourly surface relative humidity.

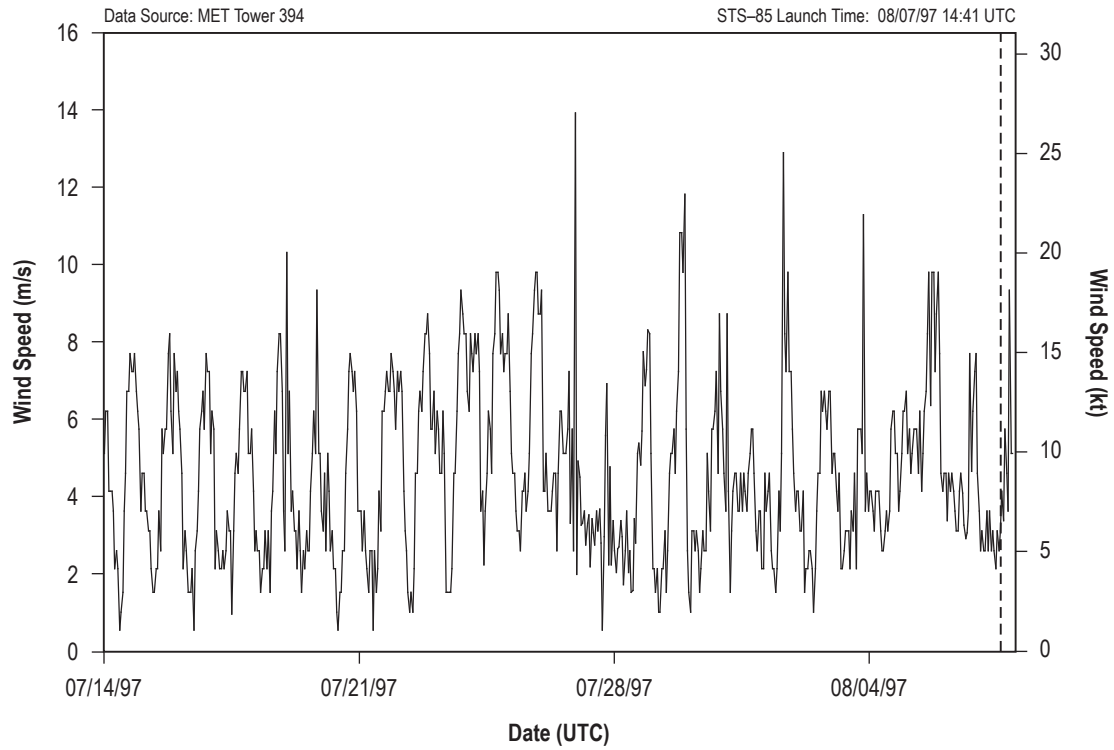


Figure 519. STS-85 hourly surface wind speed.

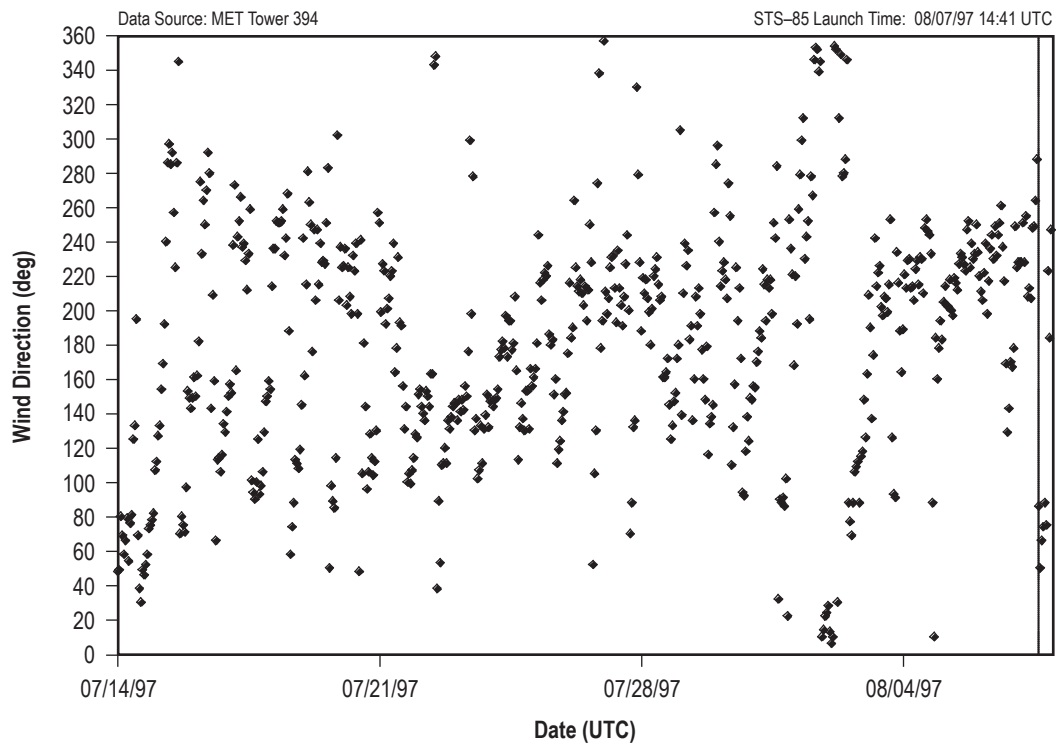


Figure 520. STS-85 hourly surface wind direction.



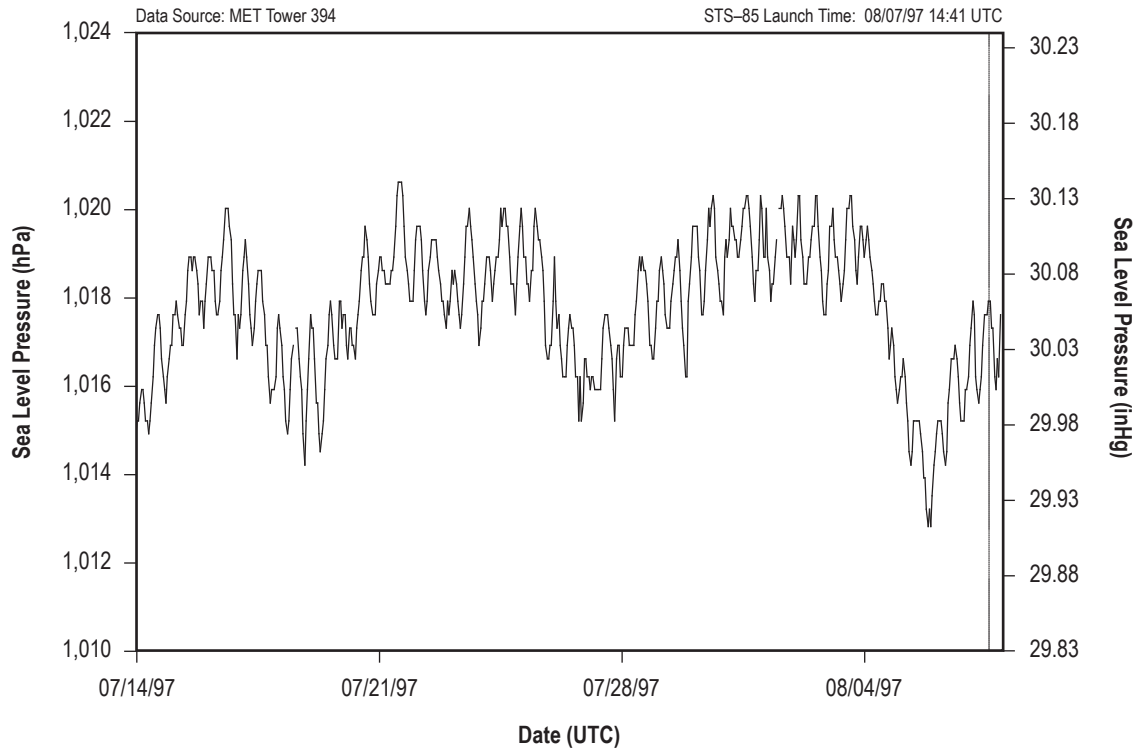


Figure 521. STS-85 hourly sea level pressure.

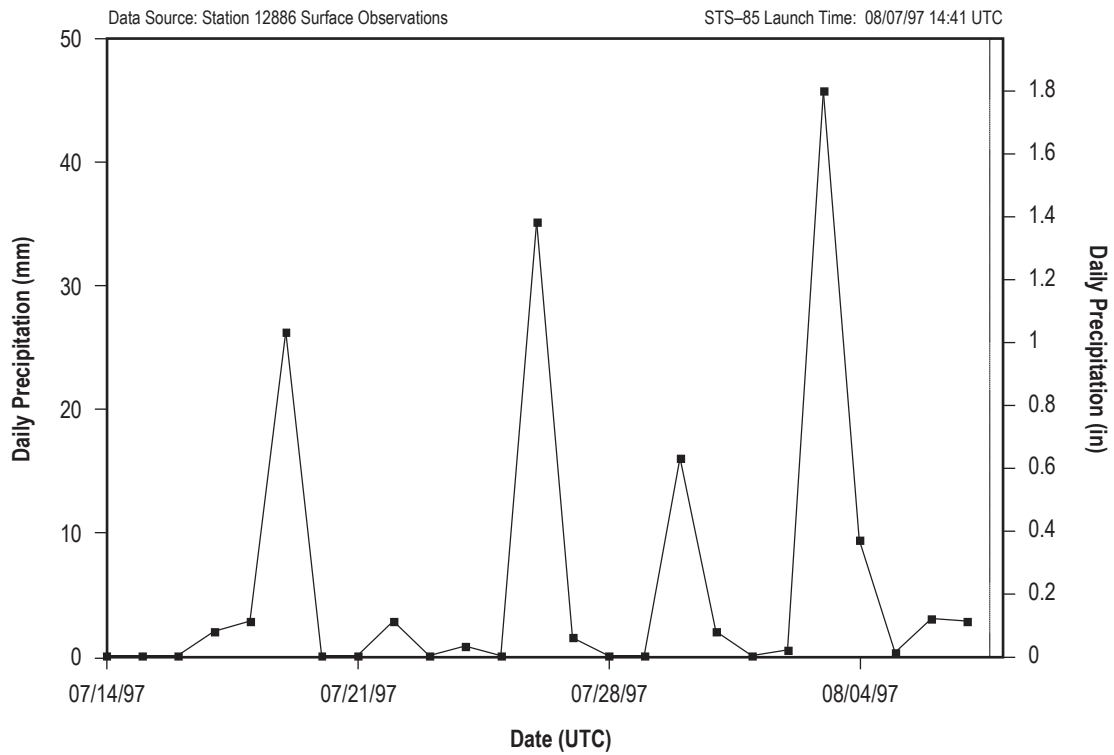


Figure 522. STS-85 daily precipitation totals.

## 5.87 STS–86

STS–86 was the 20th mission for *Atlantis* (OV–104). It rolled out to pad 39A on August 18, 1997. STS–86 was exposed on the pad for 39 days and launched on September 26, 1997, at 02:34 UTC.

### 5.87.1 STS–86 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–86 exposure period. Additionally, pressure data from MET towers 394 and 398 have been archived. Surface observations from station 74794 were also archived for this mission.

### 5.87.2 STS–86 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–86 are shown in table 177. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 177. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 177. STS–86 L–0 surface observations.

Temperature	26.2 °C (79.2 °F)
Relative humidity	92%
Sea level pressure	1,010.6 hPa (29.84 inHg)
Wind speed	3.4 m/s (6.7 kt) (1-min average)
Wind direction	188° (1-min average)
Sky condition	1/8 cumulonimbus at 762 m (2,500 ft); 5/8 cirrostratus at 8,230 m (27,000 ft)
Visibility	14.5 km (7.8 nmi)

### 5.87.3 STS–86 Pad Exposure Period Hourly Meteorological Parameters

Figures 523–528 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–86 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 178. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure data were also measured at MET tower 394. Precipitation was measured at station 12886.

Table 178. STS–86 pad exposure period hourly extremes.

Minimum temperature	22.8 °C (73 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	54%
Maximum relative humidity	99%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,021.3 hPa (30.16 inHg)
Maximum wind speed and associated wind direction	16 m/s (31 kt) 52°
Total precipitation	131.3 mm (5.17 in)

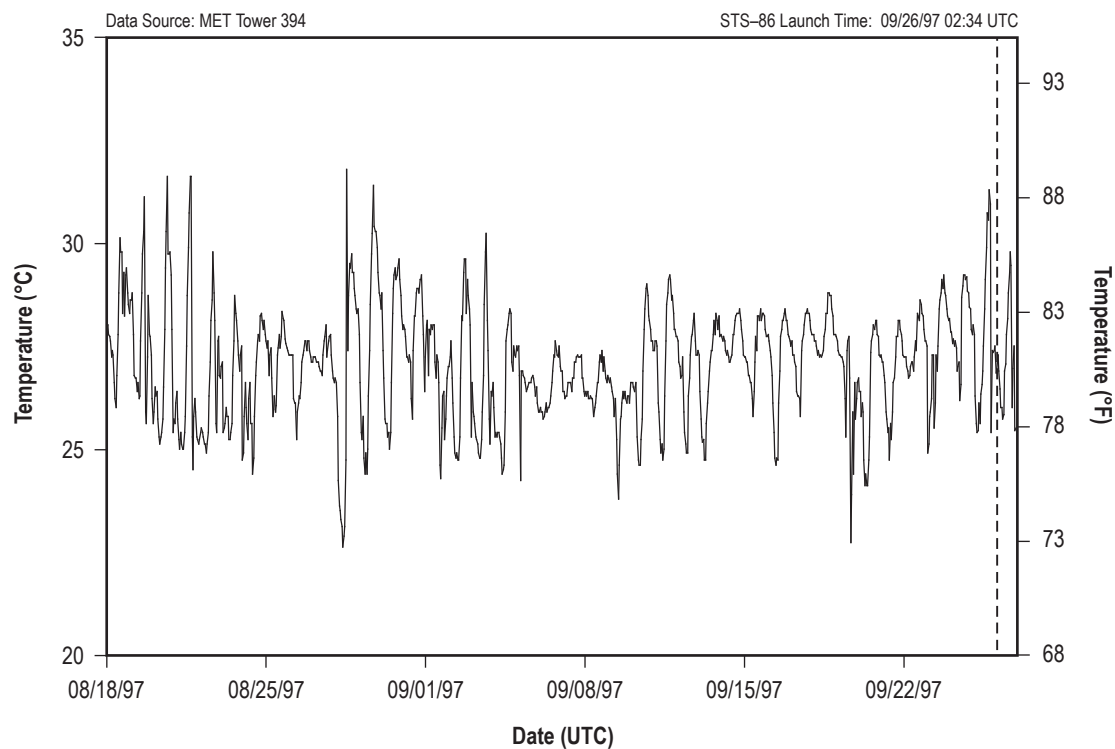


Figure 523. STS-86 hourly surface temperature.

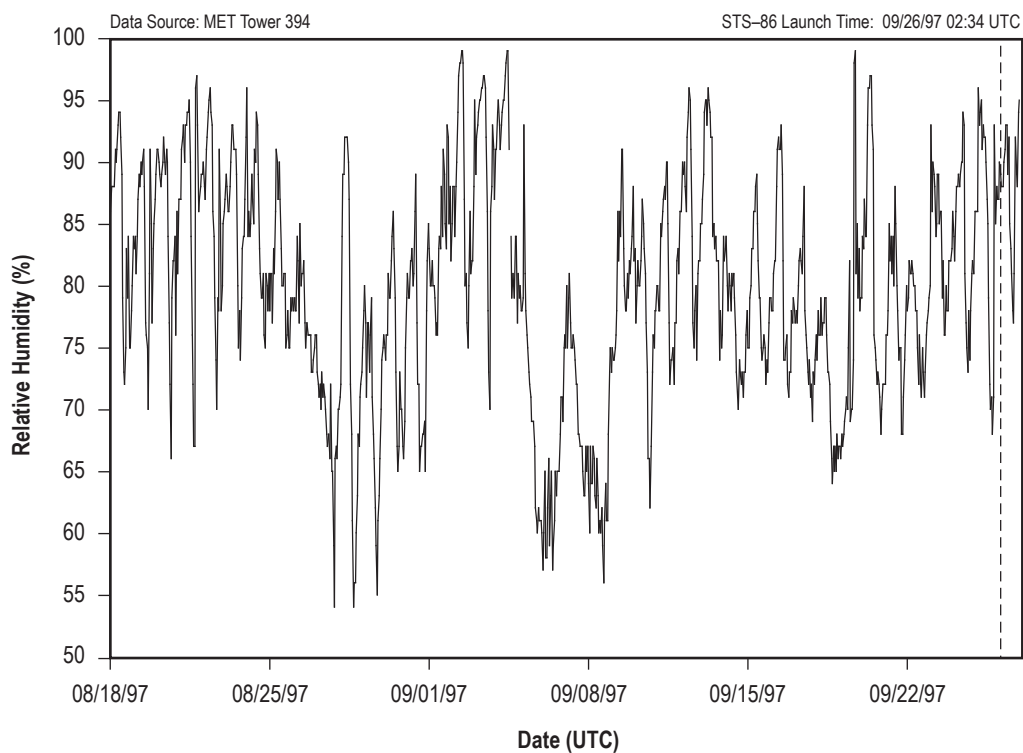


Figure 524. STS-86 hourly surface relative humidity.

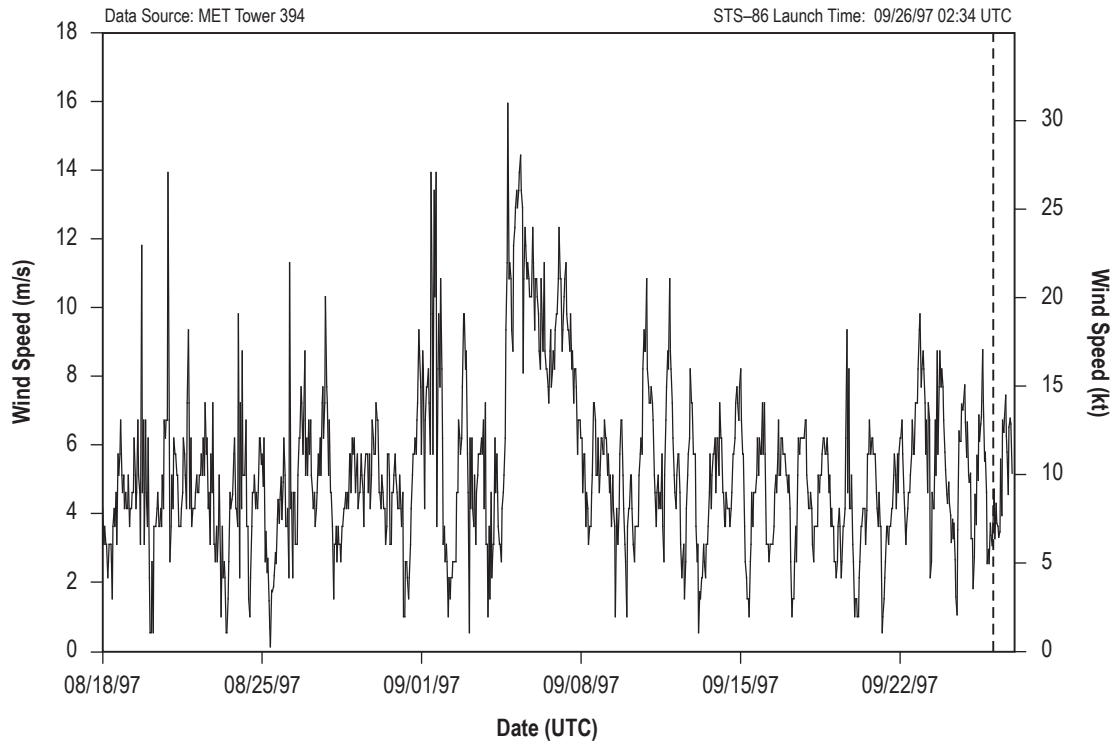


Figure 525. STS-86 hourly surface wind speed.

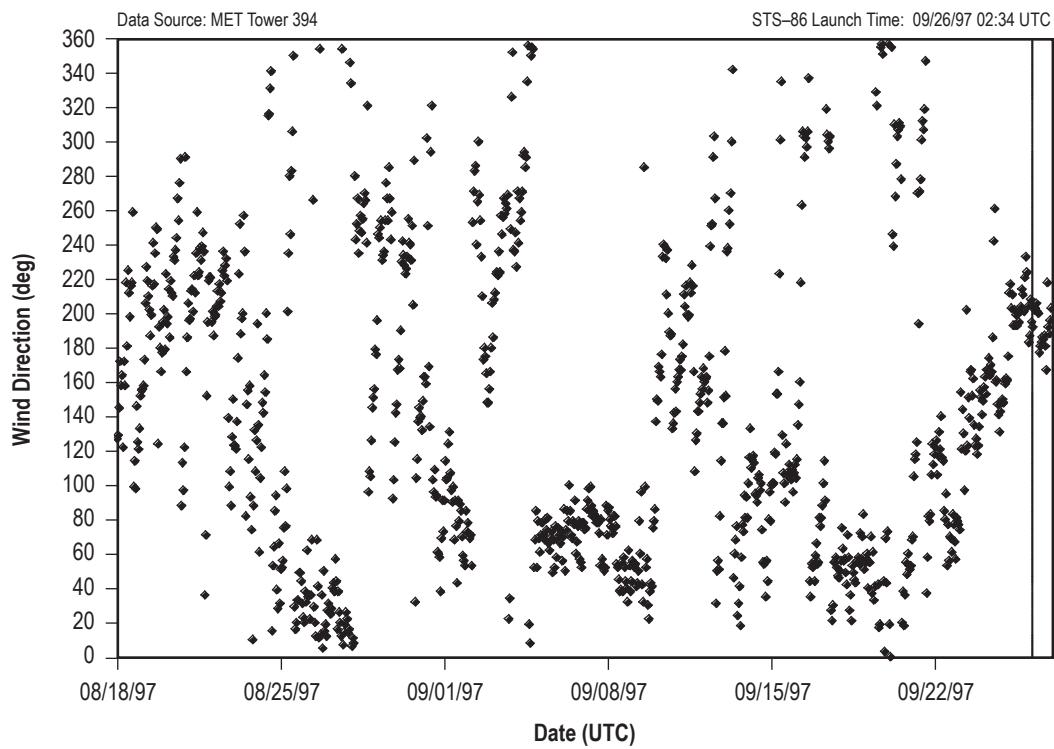


Figure 526. STS-86 hourly surface wind direction.

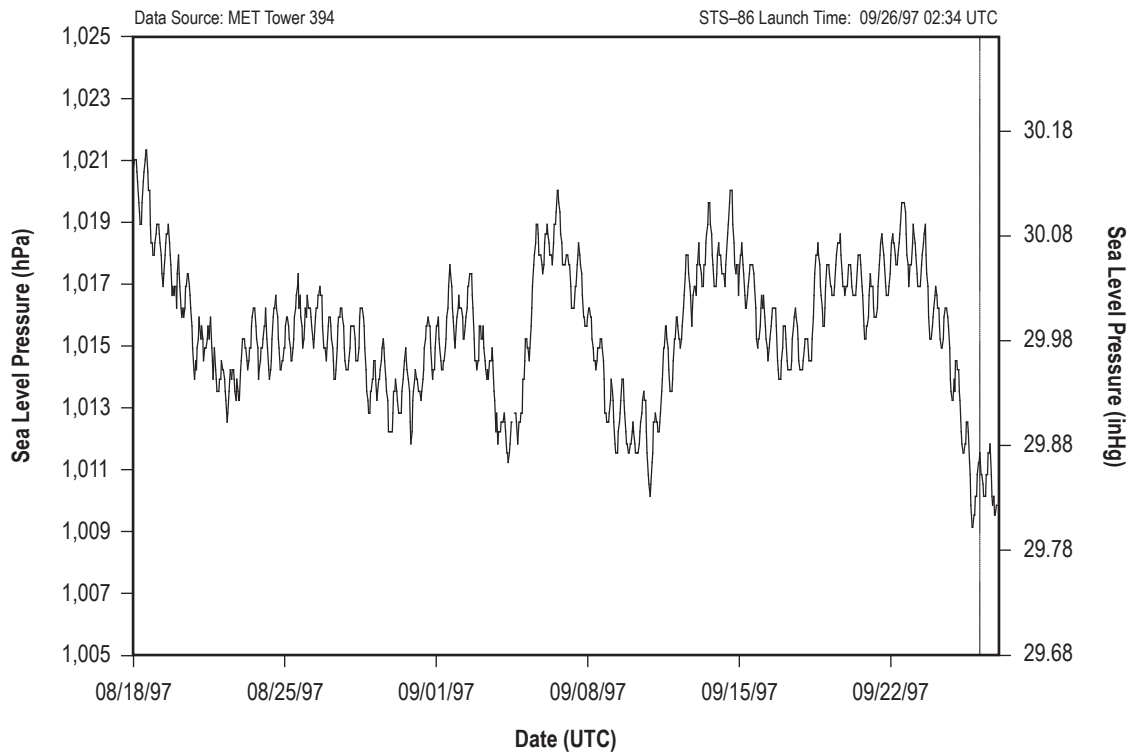


Figure 527. STS-86 hourly sea level pressure.

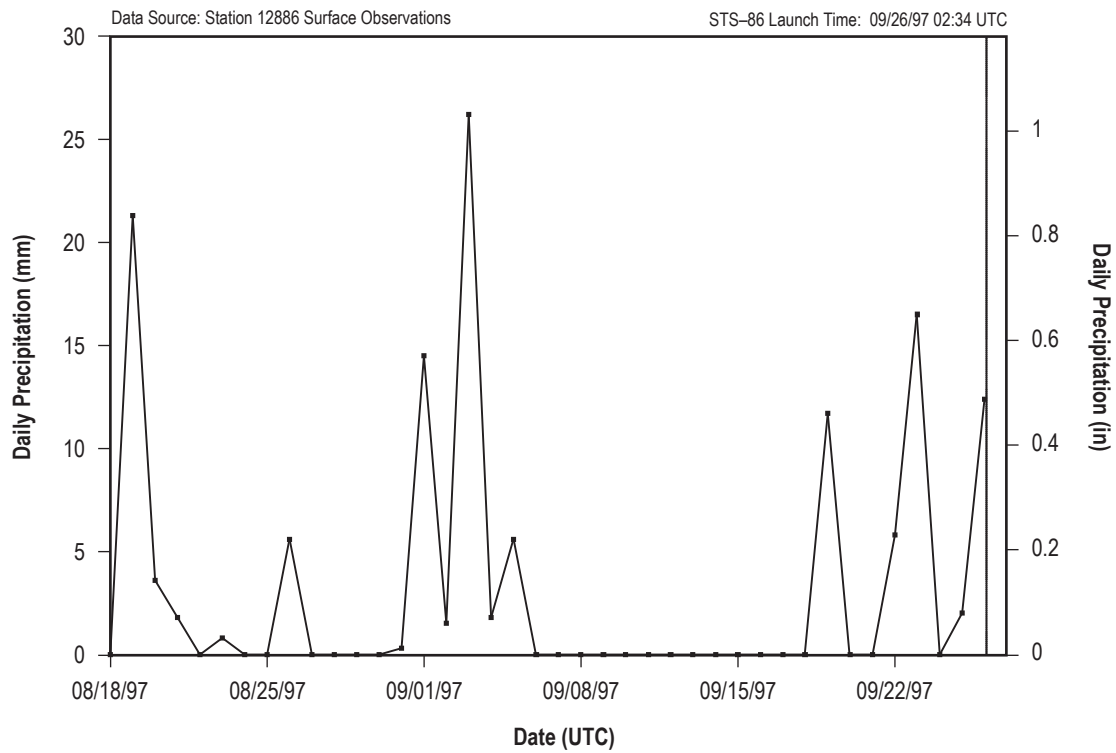


Figure 528. STS-86 daily precipitation totals.

## 5.88 STS–87

STS–87 was the 24th mission for *Columbia* (OV–102). It rolled out to pad 39B on October 29, 1997. STS–87 was exposed on the pad for 22 days and launched on November 19, 1997, at 19:46 UTC.

### 5.88.1 STS–87 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–87 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.88.2 STS–87 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–87 are shown in table 179. Temperature and relative humidity measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Pressure, sky condition, and visibility were observed at the NASA Shuttle landing facility. Pressure has been adjusted to sea level in table 179.

Table 179. STS–87 L–0 surface observations.

Temperature	20.2 °C (68.4 °F)
Relative humidity	69%
Sea level pressure	1,020.6 hPa (30.14 inHg)
Wind speed	6.4 m/s (12.5 kt) (1-min average)
Wind direction	358° (1-min average)
Sky condition	1/8 cumulus at 762 m (2,500 ft); 1/8 altocumulus at 2,743 m (9,000 ft); 8/8 cirrostratus at 8,534 m (28,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.88.3 STS–87 Pad Exposure Period Hourly Meteorological Parameters

Figures 529–534 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–87 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 180. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 398.

Table 180. STS–87 pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	37%
Maximum relative humidity	99%
Minimum sea level pressure	1,001 hPa (29.56 inHg)
Maximum sea level pressure	1,027.4 hPa (30.34 inHg)
Maximum wind speed and associated wind direction	18 m/s (35 kt) 224°
Total precipitation	73.2 mm (2.88 in)

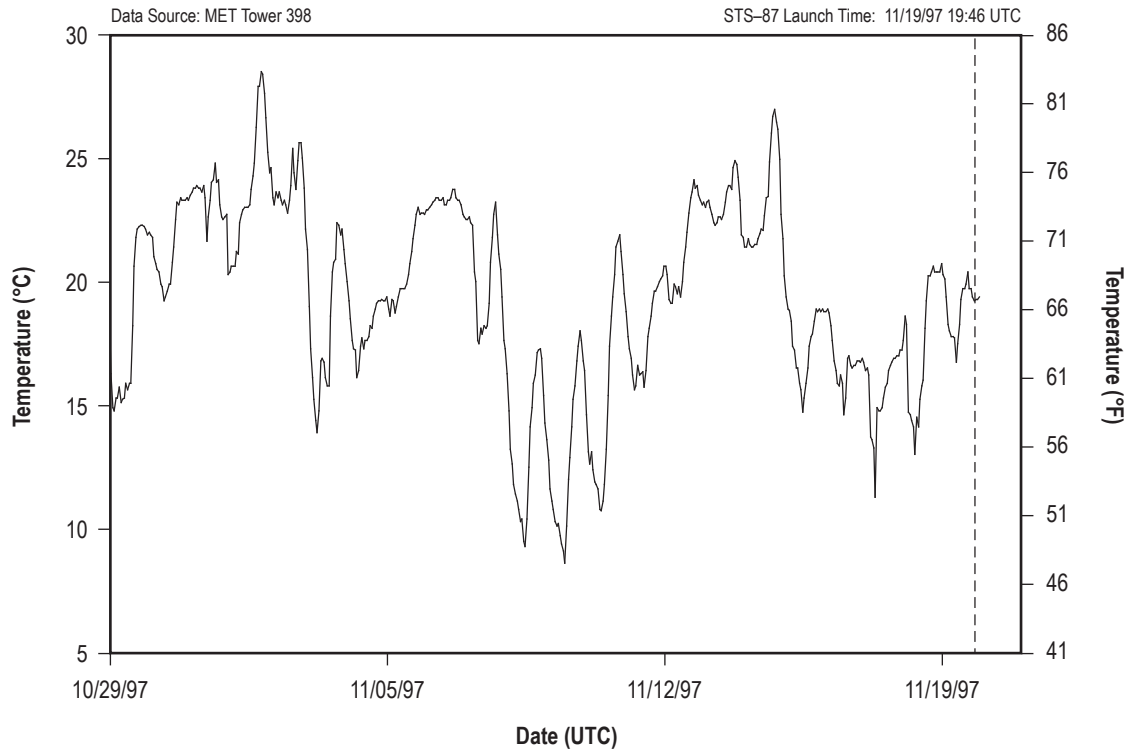


Figure 529. STS-87 hourly surface temperature.

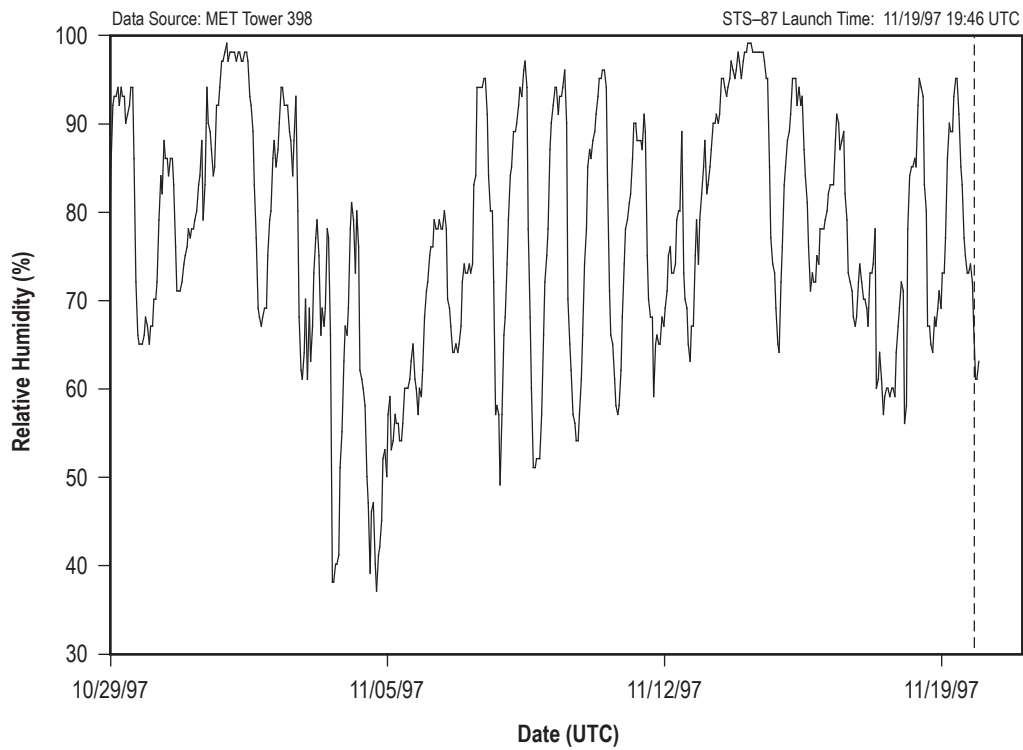


Figure 530. STS-87 hourly surface relative humidity.

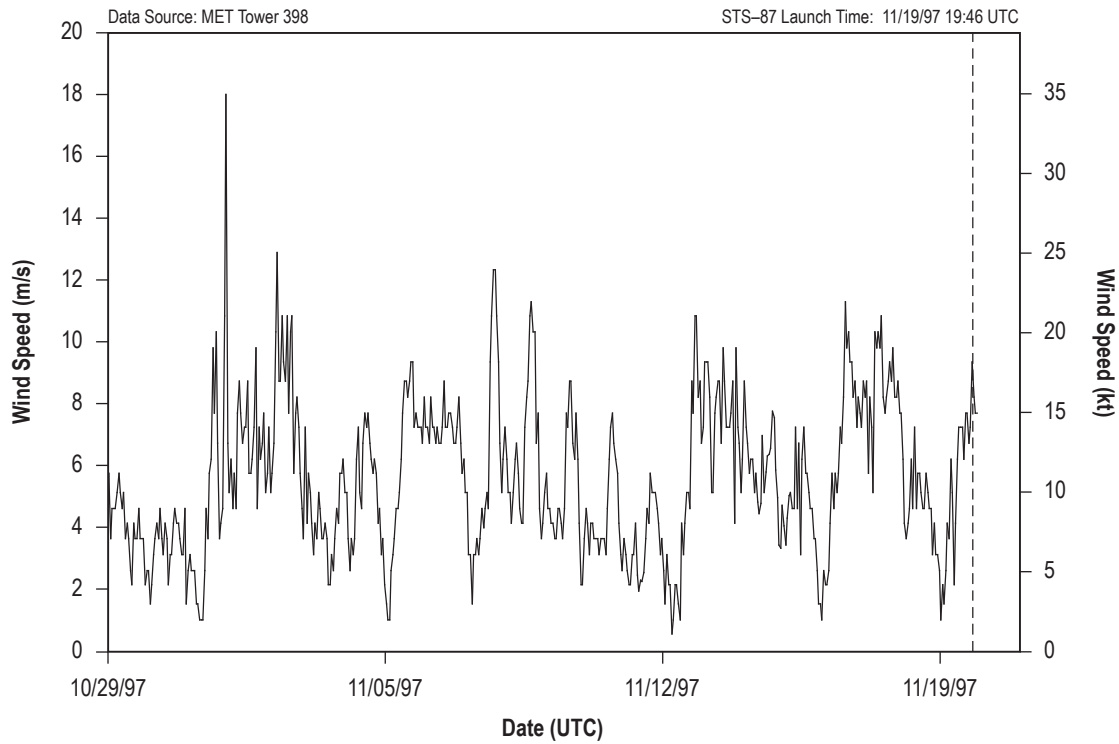


Figure 531. STS-87 hourly surface wind speed.

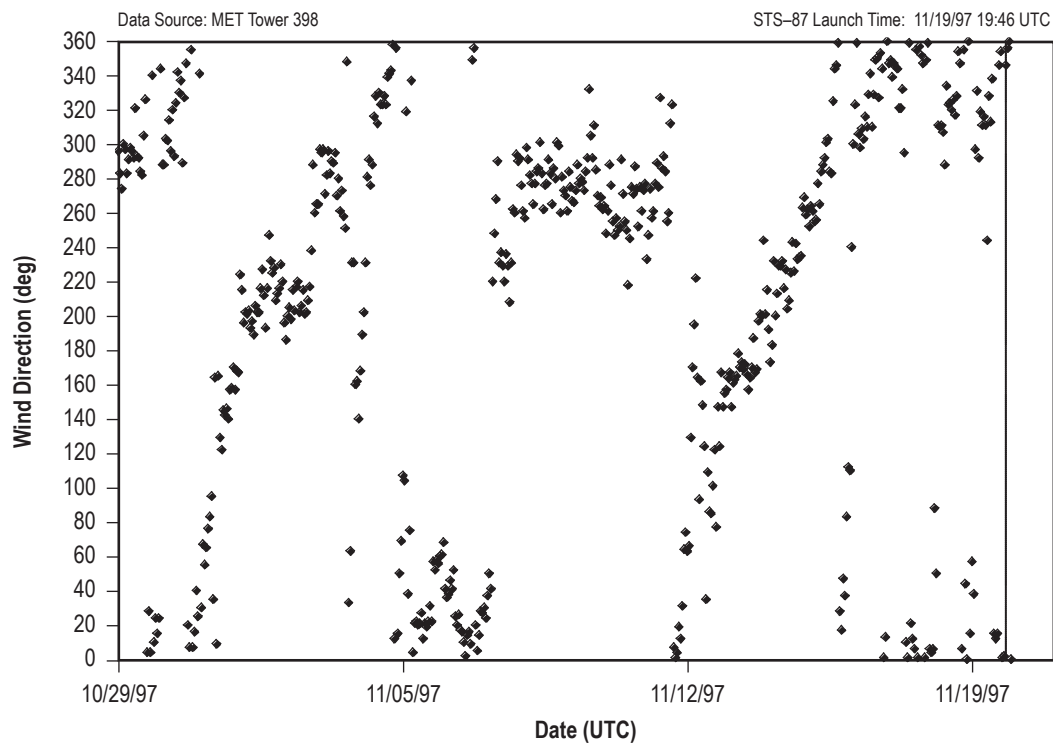


Figure 532. STS-87 hourly surface wind direction.



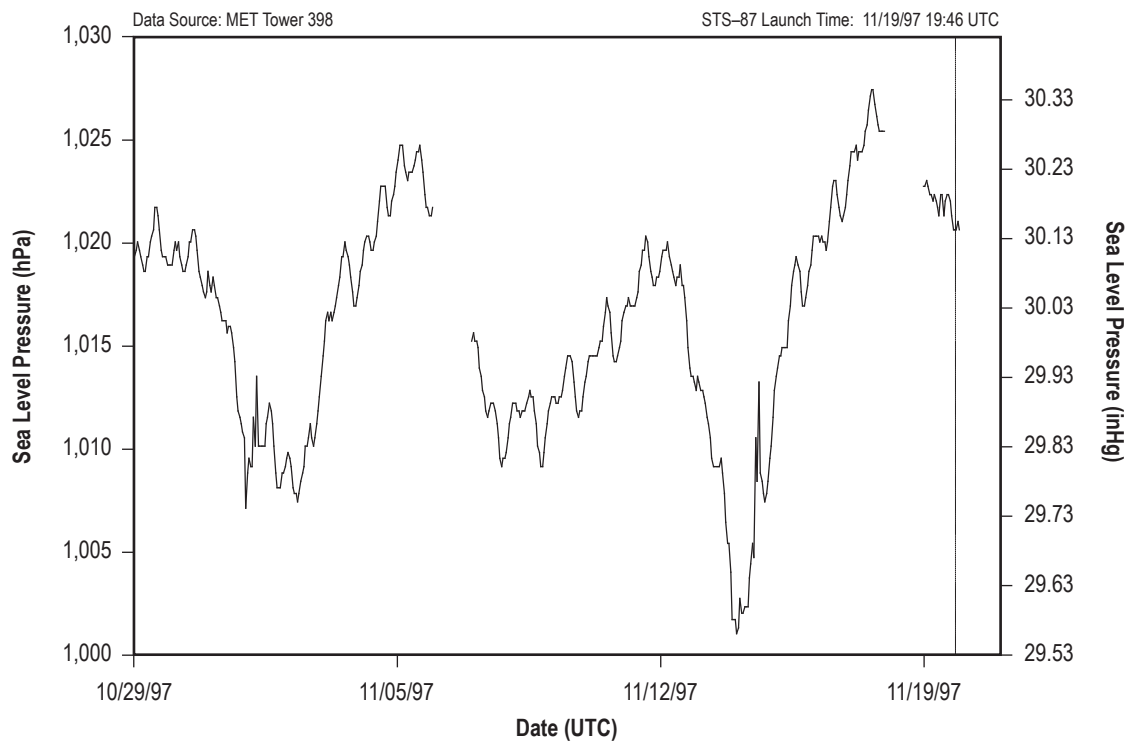


Figure 533. STS-87 hourly sea level pressure.

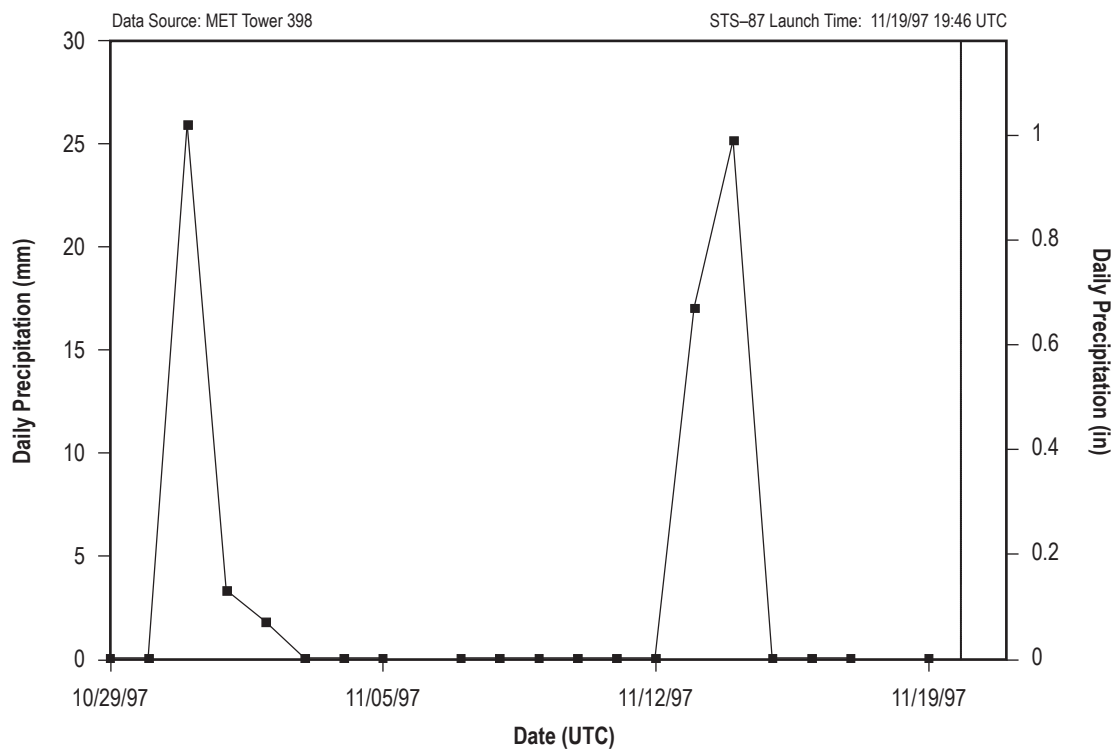


Figure 534. STS-87 daily precipitation totals.

## 5.89 STS–89

STS–89 was the 12th mission for *Endeavour* (OV–105). It rolled out to pad 39A on December 19, 1997. STS–89 was exposed on the pad for 35 days and launched on January 23, 1998, at 02:48 UTC.

### 5.89.1 STS–89 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–89 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.89.2 STS–89 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–89 are shown in table 181. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 181. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 181. STS–89 L–0 surface observations.

Temperature	20 °C (68 °F)
Relative humidity	89%
Sea level pressure	1,016.7 hPa (30.02 inHg)
Wind speed	7.9 m/s (15.4 kt) (1-min average)
Wind direction	149° (1-min average)
Sky condition	1/8 stratocumulus at 1,524 m (5,000 ft); 1/8 altocumulus at 3,962 m (13,000 ft); 1/8 cirrostratus at 6,401 m (21,000 ft)
Visibility	14.5 km (7.8 nmi)

### 5.89.3 STS–89 Pad Exposure Period Hourly Meteorological Parameters

Figures 535–540 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–89 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 182. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 394.

Table 182. STS–89 pad exposure period hourly extremes.

Minimum temperature	6.1 °C (43 °F)
Maximum temperature	25.6 °C (78 °F)
Minimum relative humidity	29%
Maximum relative humidity	100%
Minimum sea level pressure	1,003 hPa (29.62 inHg)
Maximum sea level pressure	1,035.2 hPa (30.57 inHg)
Maximum wind speed and associated wind direction	18 m/s (35 kt) 353°
Total precipitation	74.4 mm (2.93 in)

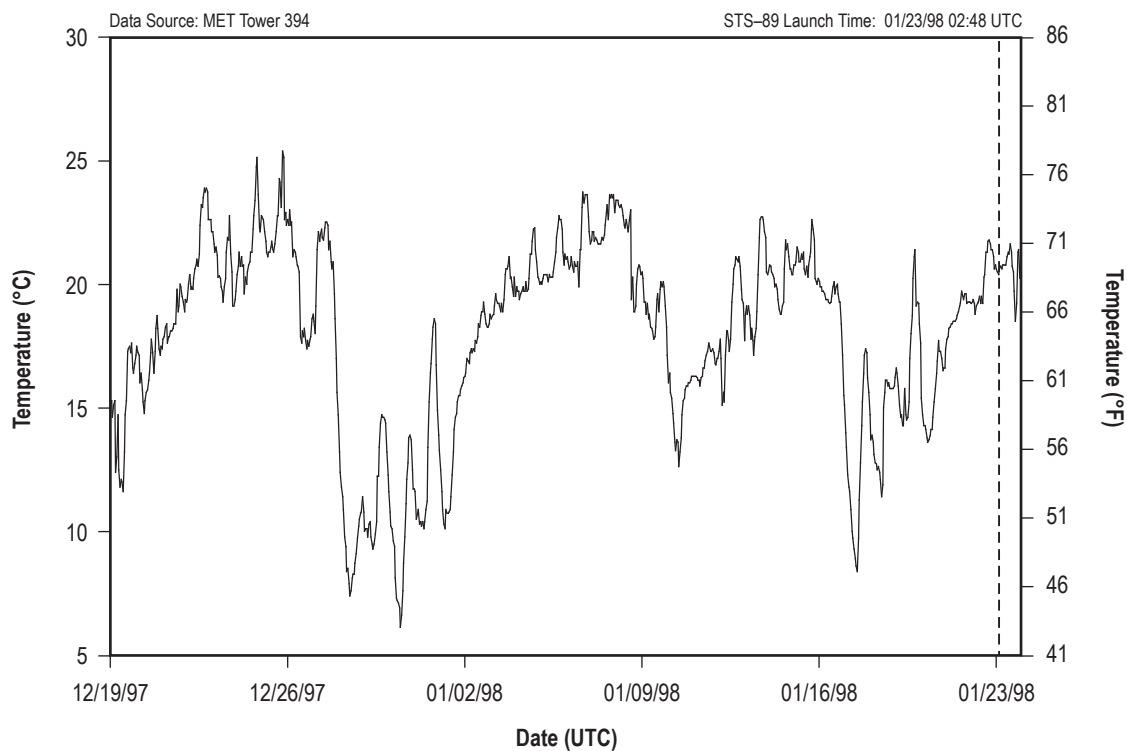


Figure 535. STS-89 hourly surface temperature.

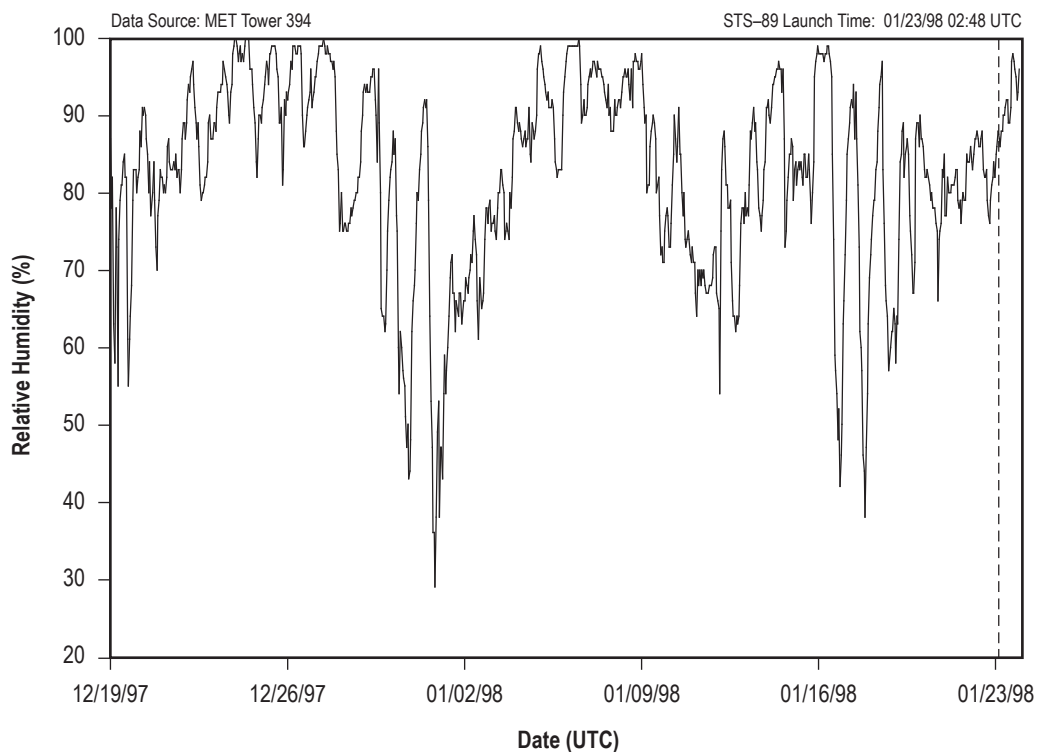


Figure 536. STS-89 hourly surface relative humidity.

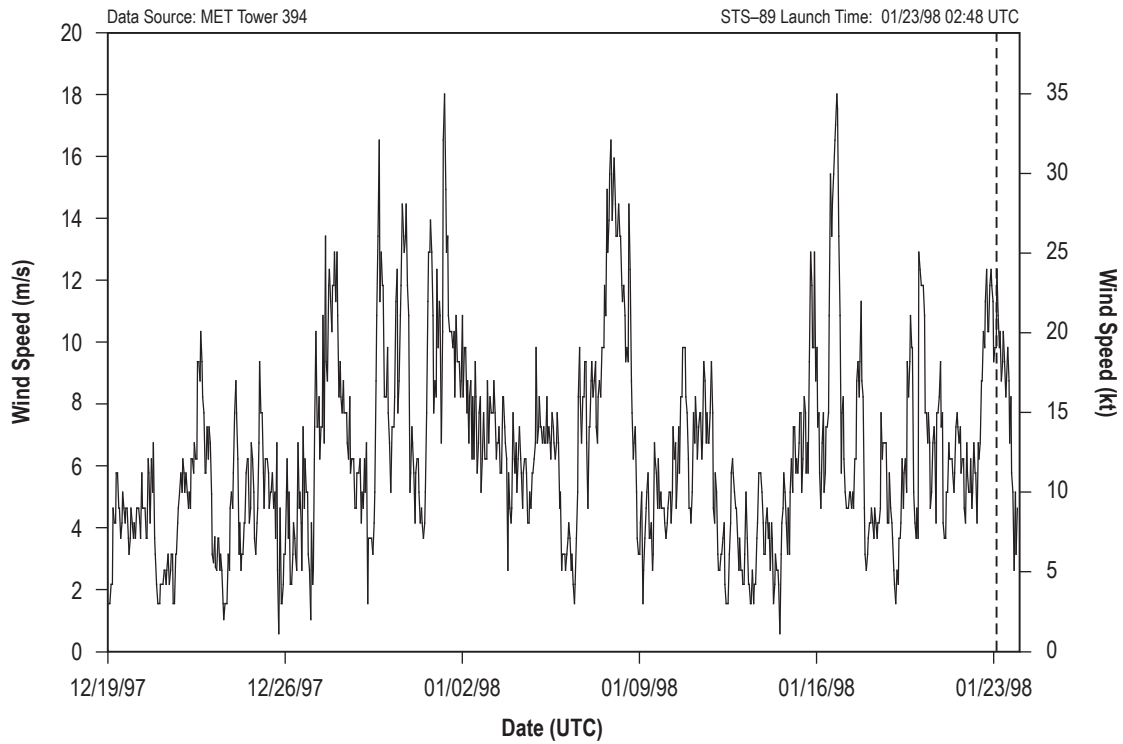


Figure 537. STS-89 hourly surface wind speed.

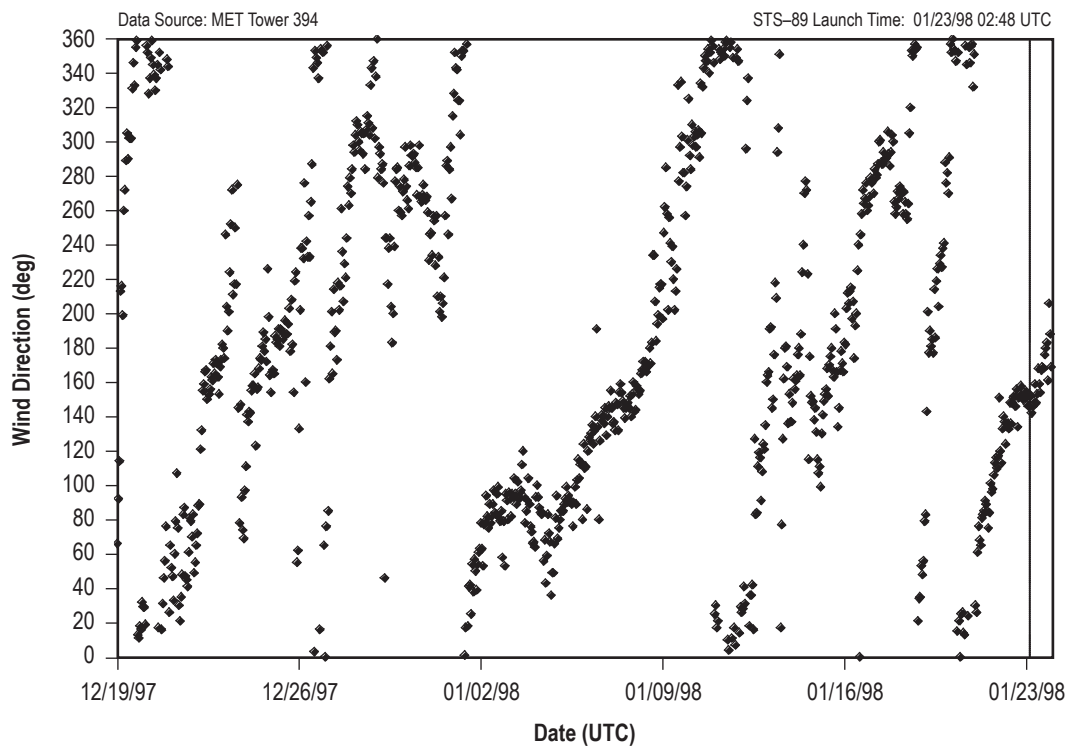


Figure 538. STS-89 hourly surface wind direction.

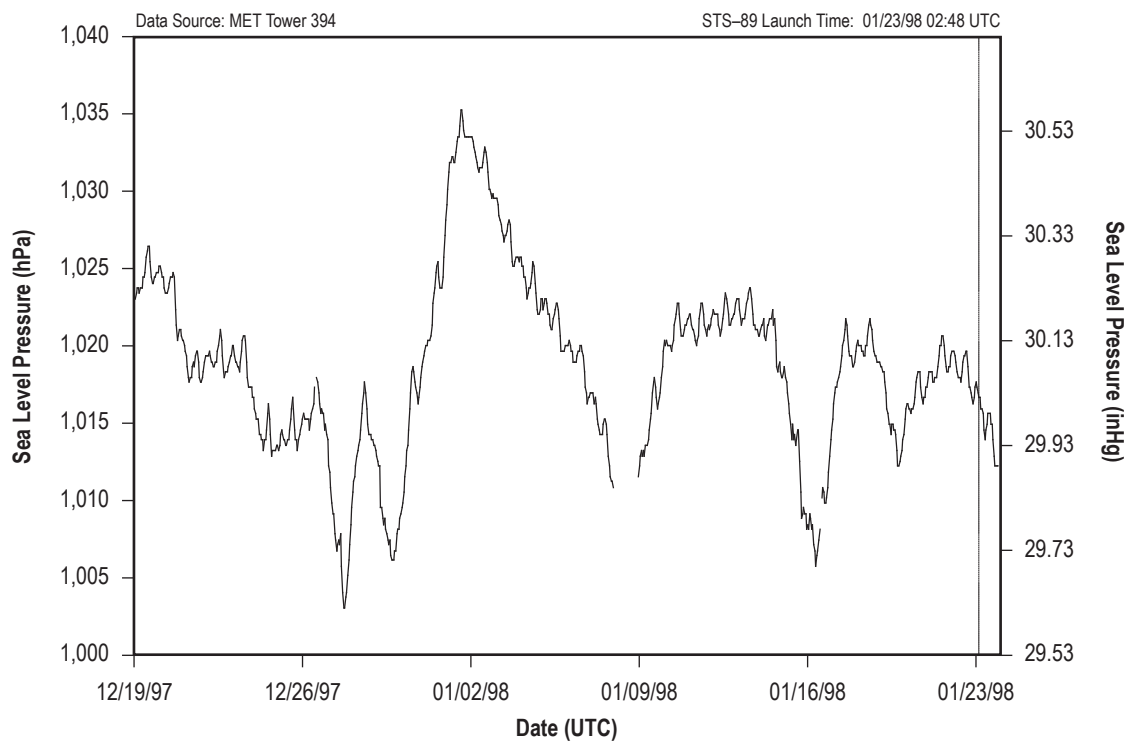


Figure 539. STS-89 hourly sea level pressure.

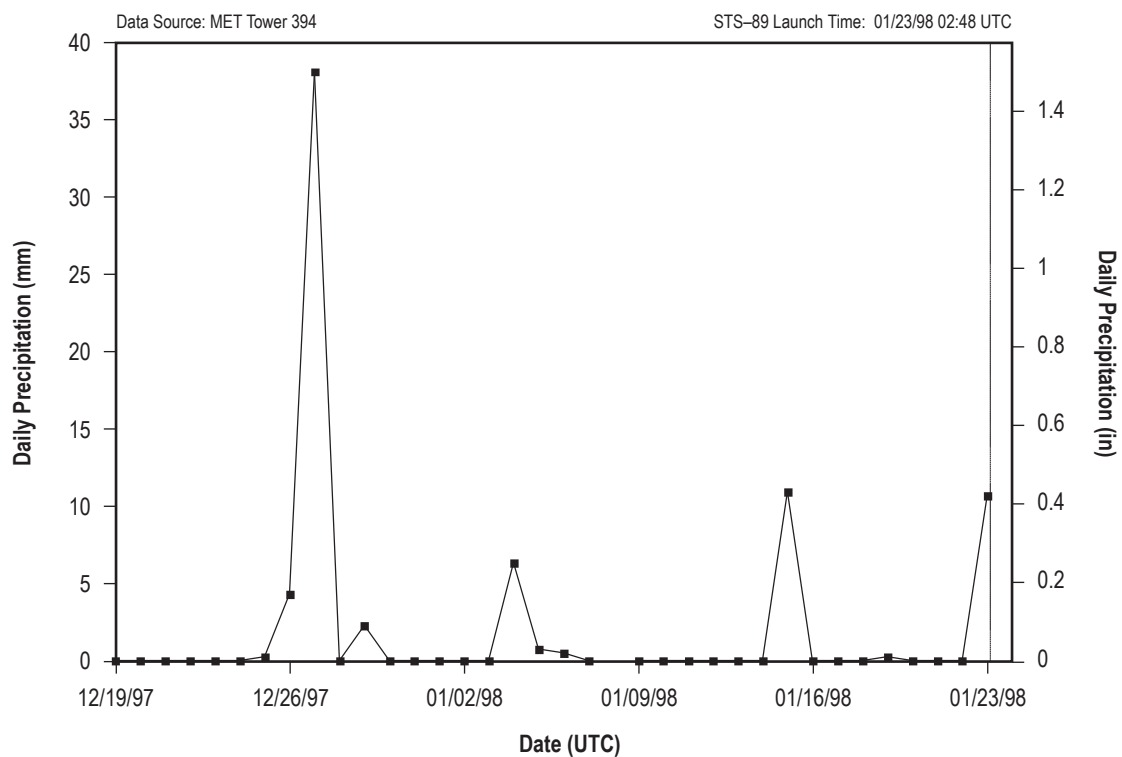


Figure 540. STS-89 daily precipitation totals.

## 5.90 STS-90

STS-90 was the 25th mission for *Columbia* (OV-102). It rolled out to pad 39B on March 23, 1998. STS-90 was exposed on the pad for 26 days and launched on April 17, 1998, at 18:19 UTC.

### 5.90.1 STS-90 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-90 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.90.2 STS-90 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-90 are shown in table 183. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 183. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 183. STS-90 L-0 surface observations.

Temperature	27 °C (80.6 °F)
Relative humidity	63%
Sea level pressure	1,018 hPa (30.06 inHg)
Wind speed	6.3 m/s (12.2 kt) (1-min average)
Wind direction	144° (1-min average)
Sky condition	2/8 cumulus at 1,006 m (3,300 ft)
Visibility	16.1 km (8.7 nmi)

### 5.90.3 STS-90 Pad Exposure Period Hourly Meteorological Parameters

Figures 541–546 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-90 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 184. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 398.

Table 184. STS-90 pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	29.4 °C (85 °F)
Minimum relative humidity	30%
Maximum relative humidity	100%
Minimum sea level pressure	1,004.7 hPa (29.67 inHg)
Maximum sea level pressure	1,031.8 hPa (30.47 inHg)
Maximum wind speed and associated wind direction	18 m/s (35 kt) 256°
Total precipitation	5.6 mm (0.22 in)

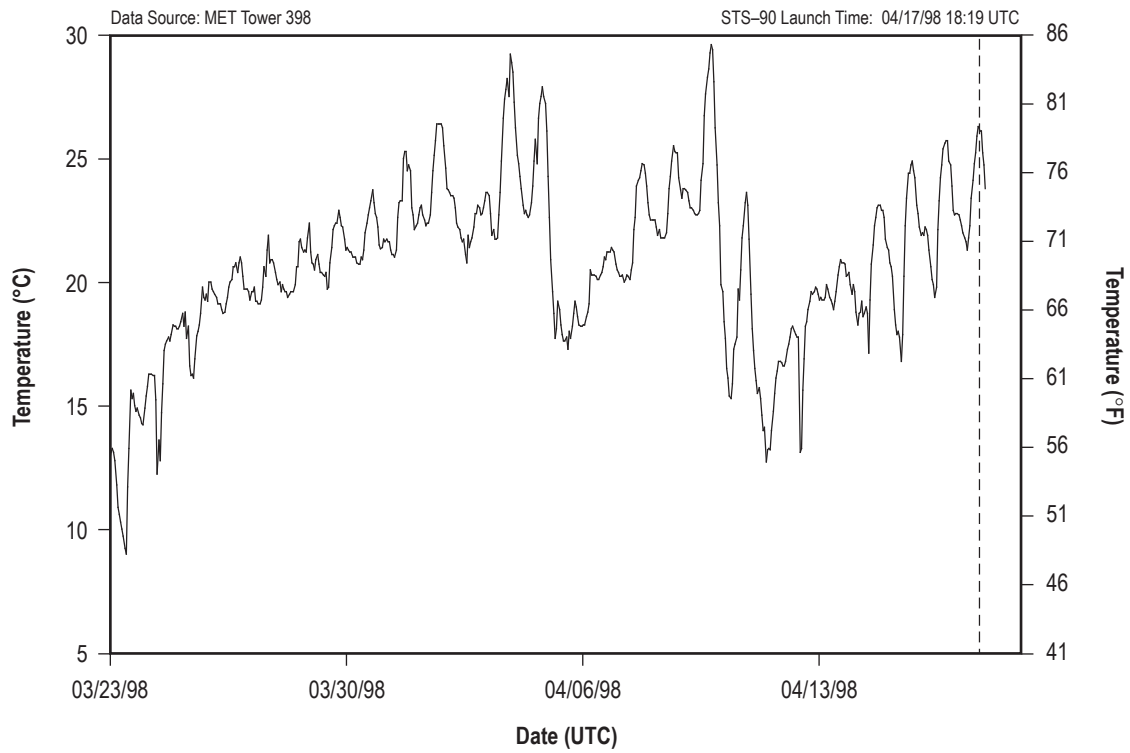


Figure 541. STS-90 hourly surface temperature.

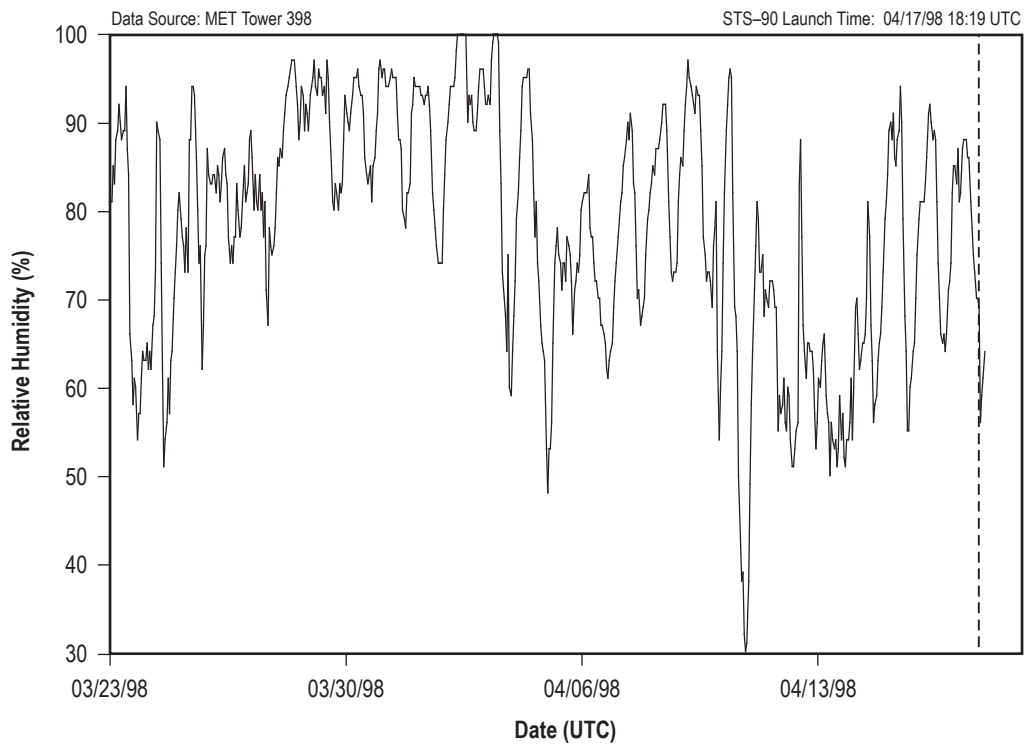


Figure 542. STS-90 hourly surface relative humidity.

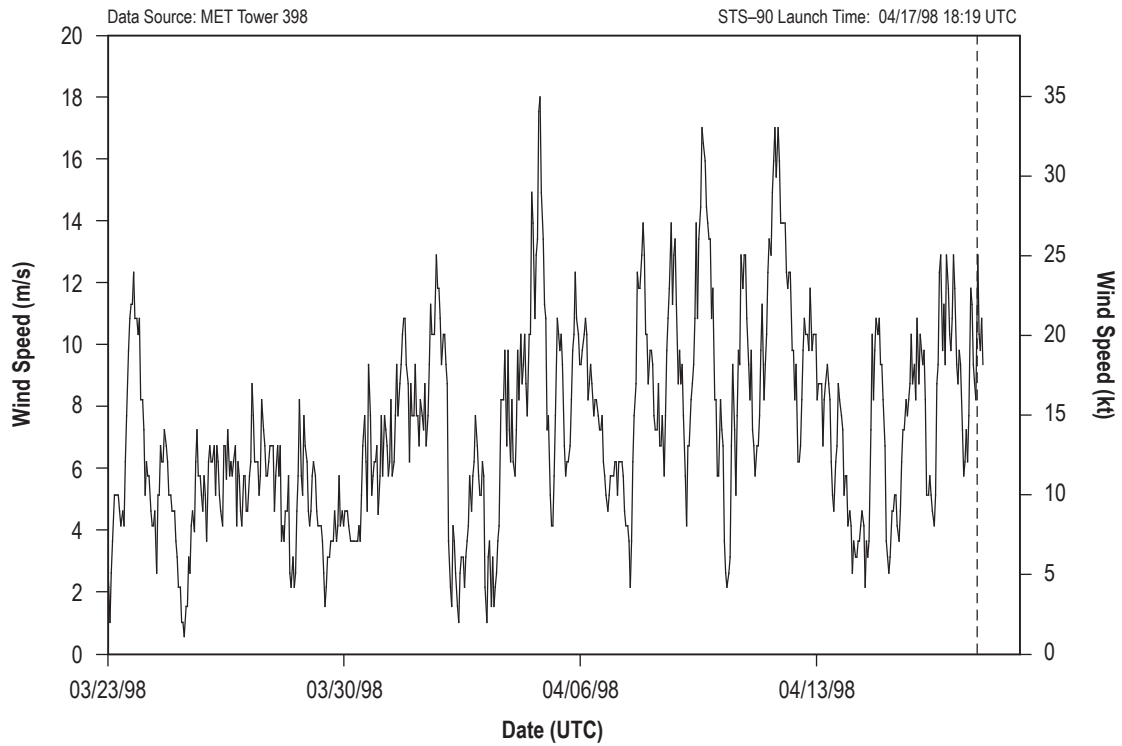


Figure 543. STS-90 hourly surface wind speed.

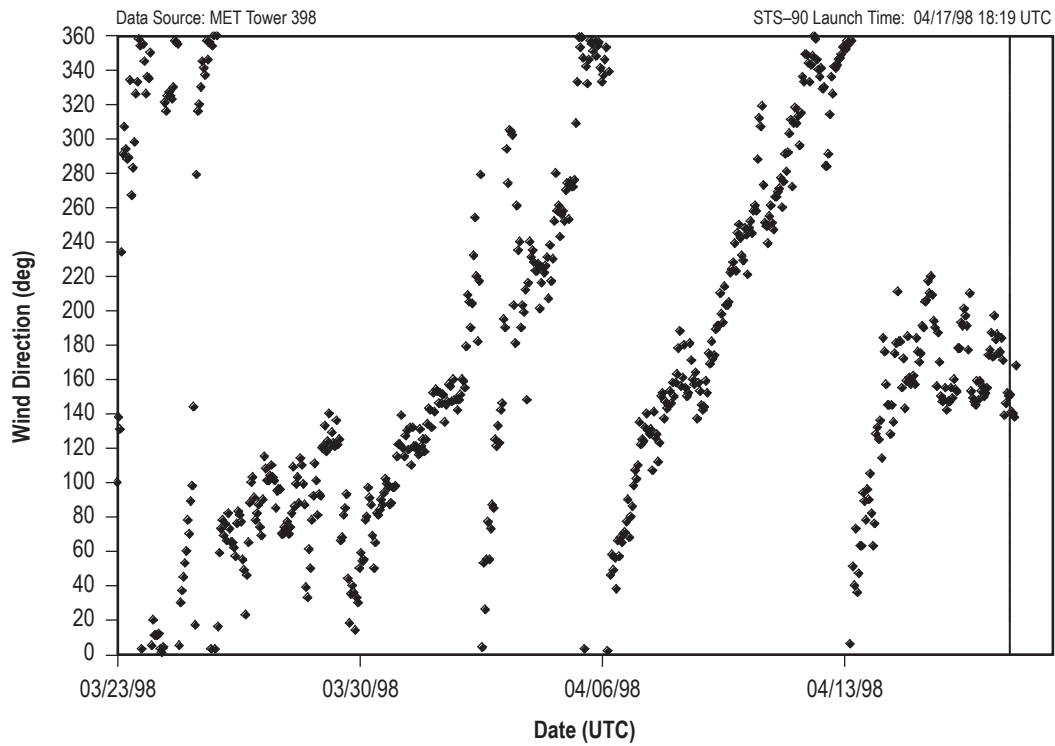


Figure 544. STS-90 hourly surface wind direction.



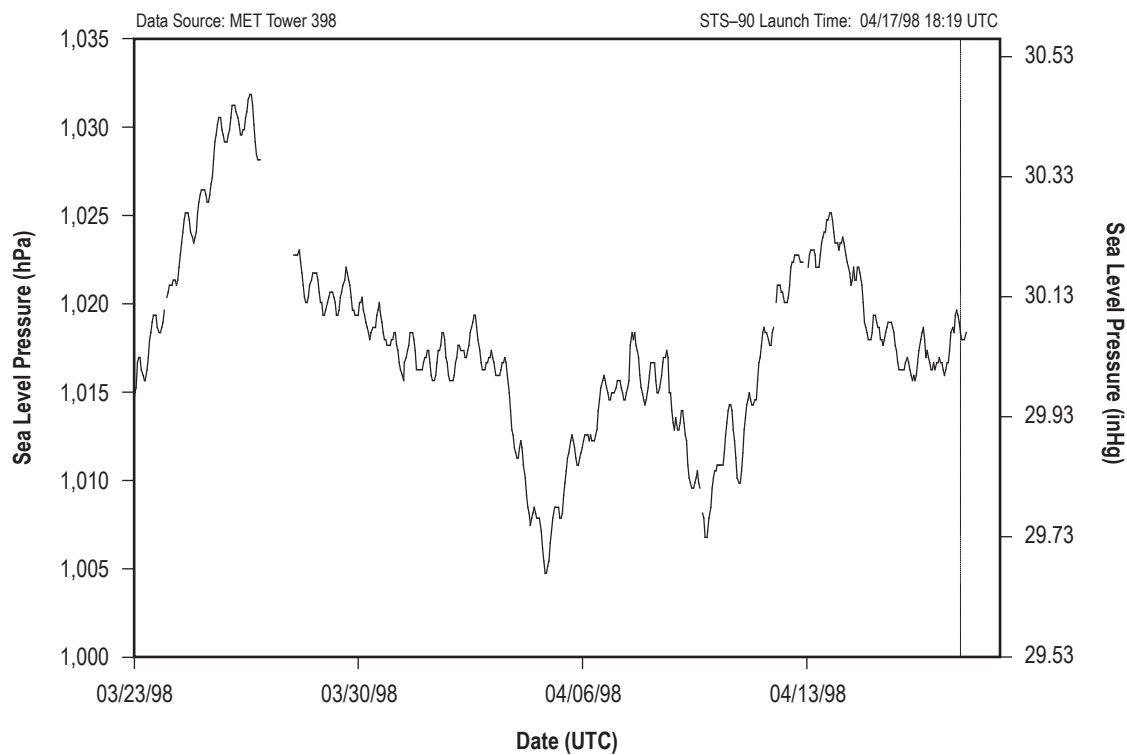


Figure 545. STS-90 hourly sea level pressure.

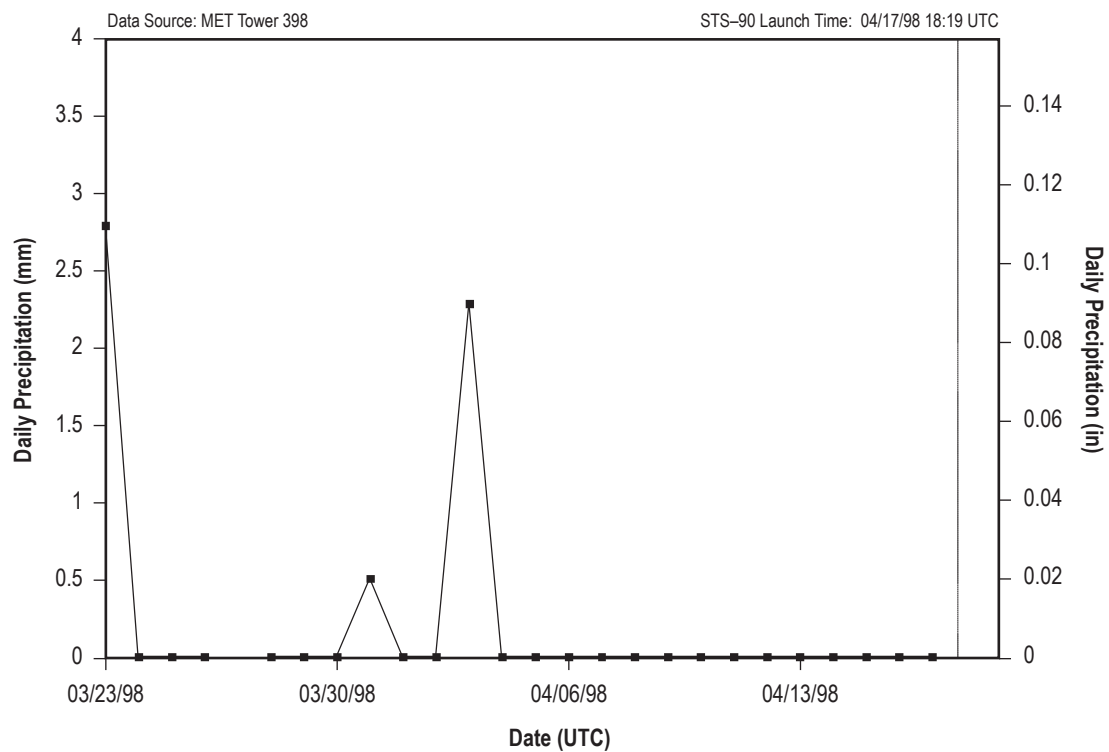


Figure 546. STS-90 daily precipitation totals.

## 5.91 STS–91

STS–91 was the 24th mission for *Discovery* (OV–103). It rolled out to pad 39A on May 2, 1998. STS–91 was exposed on the pad for 32 days and launched on June 2, 1998, at 22:06 UTC.

### 5.91.1 STS–91 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–91 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.91.2 STS–91 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–91 are shown in table 185. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 185. Wind speed and wind direction were obtained from pad 39A, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 185. STS–91 L–0 surface observations.

Temperature	35.4 °C (95.8 °F)
Relative humidity	54%
Sea level pressure	1,009.6 hPa (29.81 inHg)
Wind speed	5.3 m/s (10.3 kt) (1-min average)
Wind direction	232° (1-min average)
Sky condition	1/8 cumulus at 1,676 m (5,500 ft)
Visibility	14.5 km (7.8 nmi)

### 5.91.3 STS–91 Pad Exposure Period Hourly Meteorological Parameters

Figures 547–552 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–91 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 186. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 394.

Table 186. STS–91 pad exposure period hourly extremes.

Minimum temperature	17.8 °C (64 °F)
Maximum temperature	35.6 °C (96 °F)
Minimum relative humidity	40%
Maximum relative humidity	100%
Minimum sea level pressure	1,004.7 hPa (29.67 inHg)
Maximum sea level pressure	1,020.6 hPa (30.14 inHg)
Maximum wind speed and associated wind direction	22.1 m/s (43 kt) 271°
Total precipitation	7.4 mm (0.29 in)

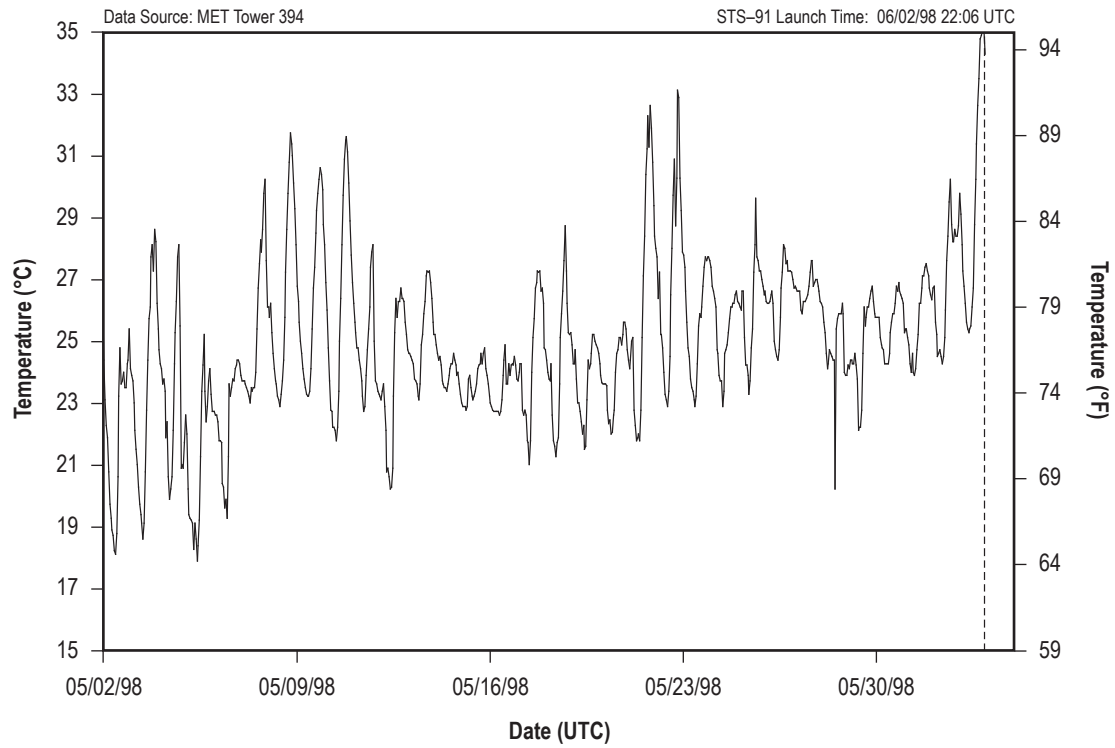


Figure 547. STS-91 hourly surface temperature.

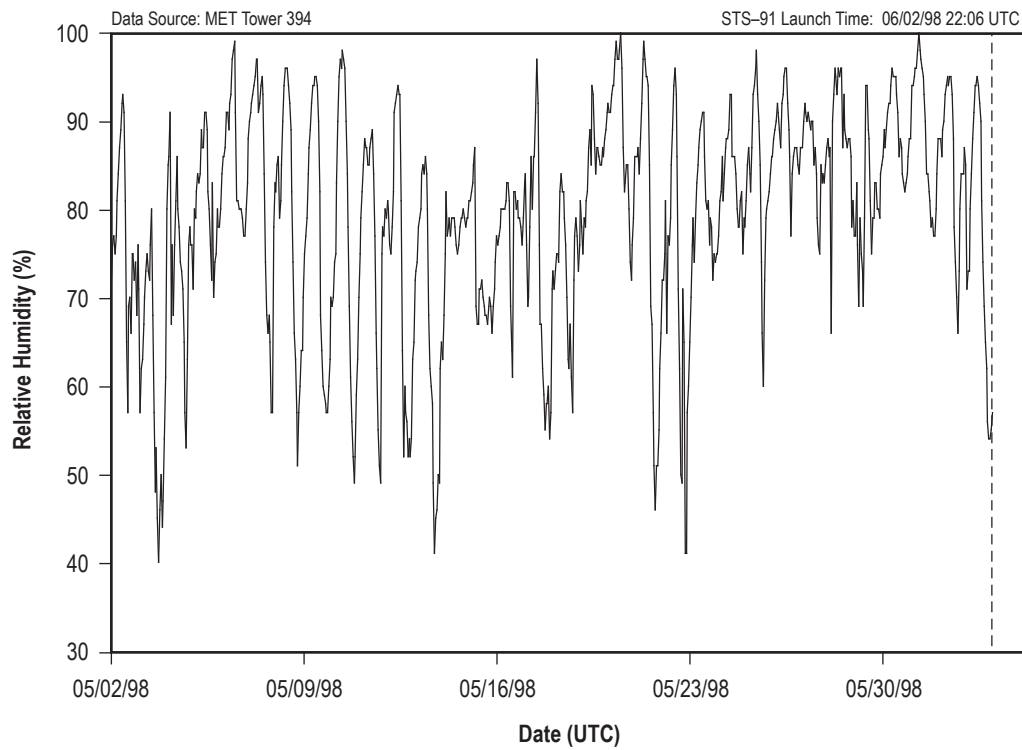


Figure 548. STS-91 hourly surface relative humidity.

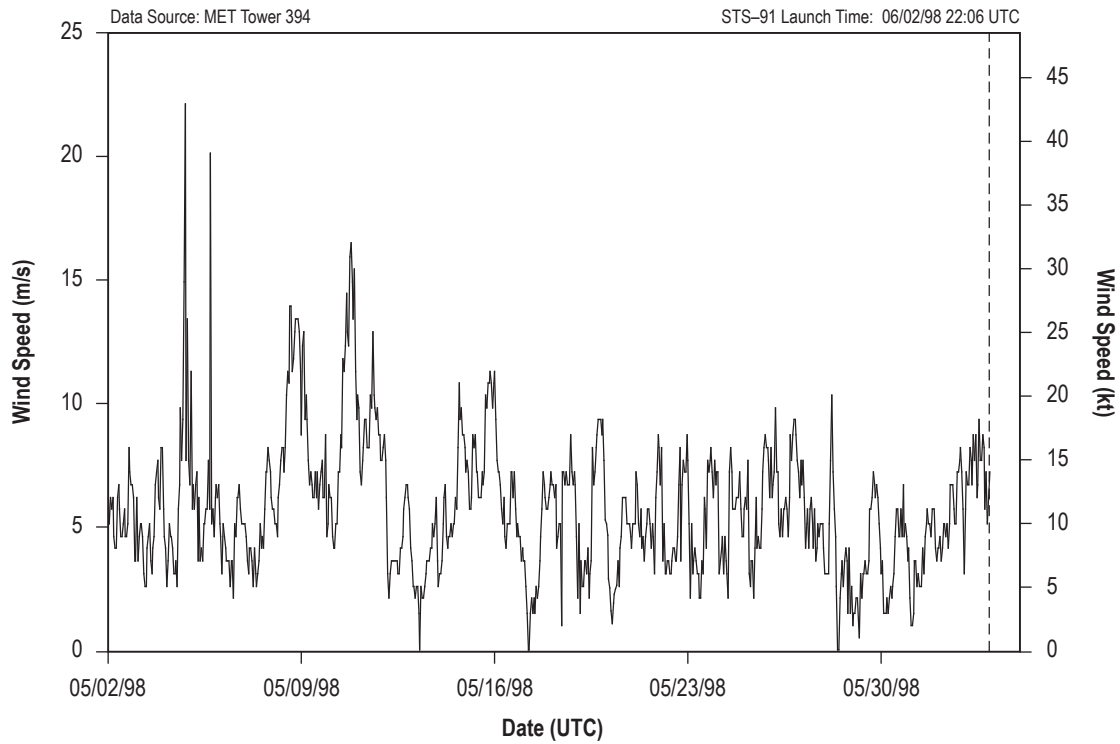


Figure 549. STS-91 hourly surface wind speed.

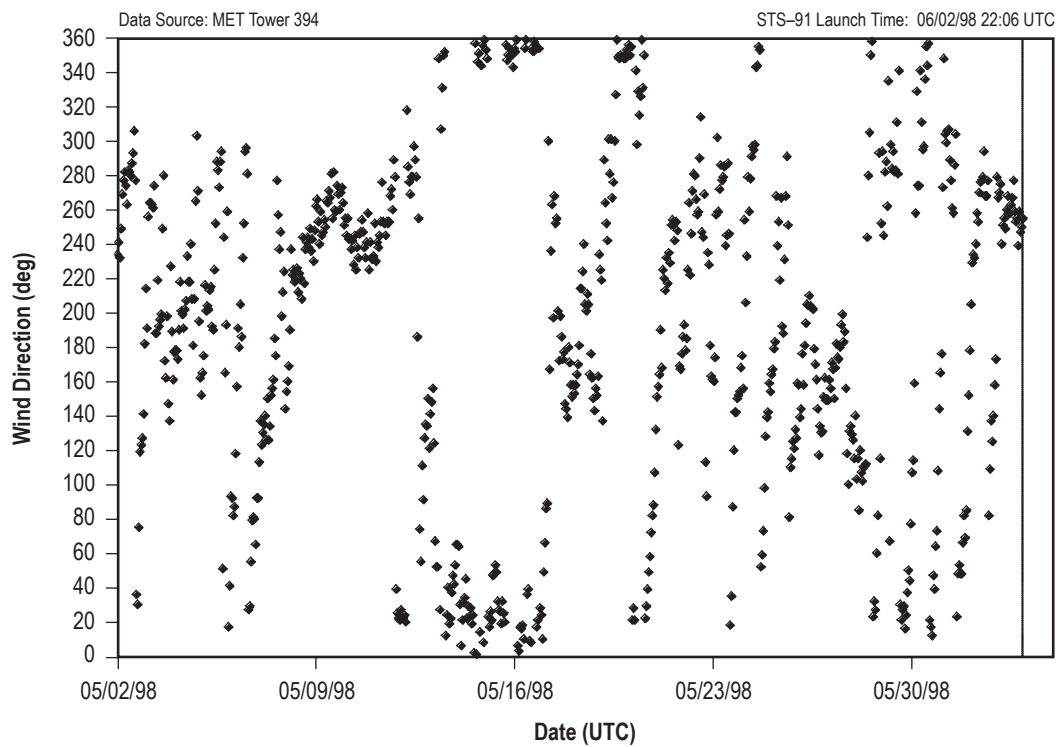


Figure 550. STS-91 hourly surface wind direction.

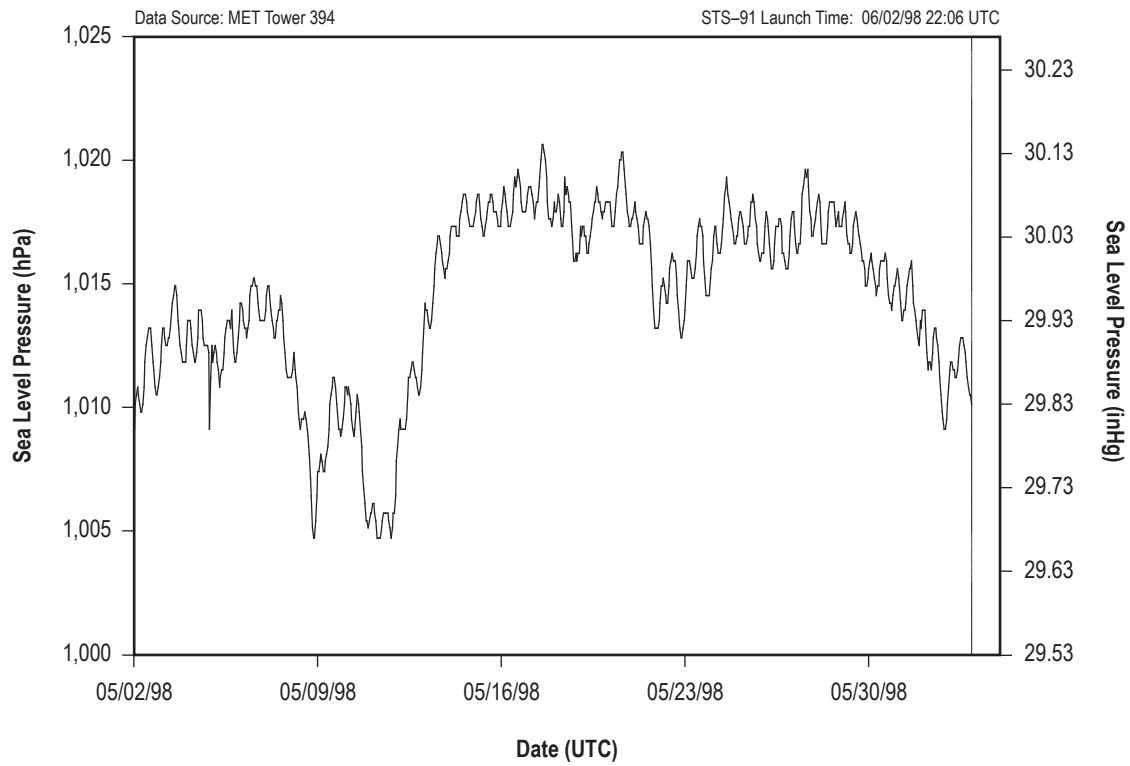


Figure 551. STS-91 hourly sea level pressure.

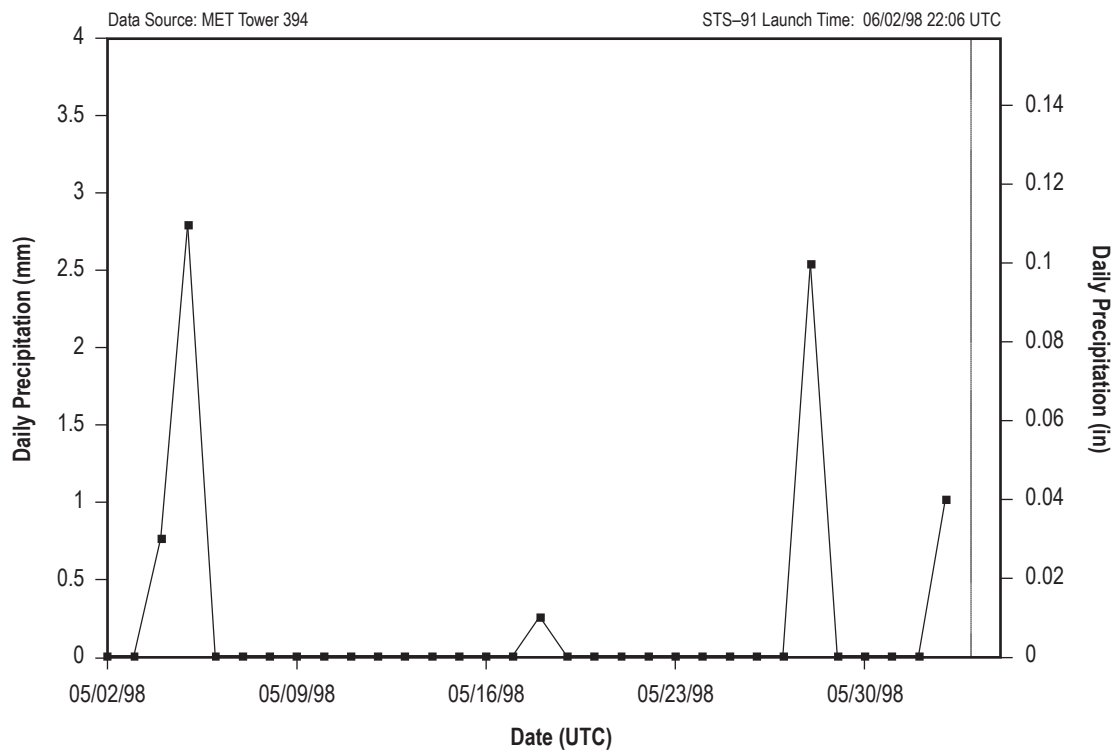


Figure 552. STS-91 daily precipitation totals.

## 5.92 STS-95

STS-95 was the 25th mission for *Discovery* (OV-103). It rolled out to pad 39B on September 21, 1998. STS-95 was exposed on the pad for 39 days and launched on October 29, 1998, at 19:20 UTC.

### 5.92.1 STS-95 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-95 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.92.2 STS-95 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-95 are shown in table 187. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 187. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 187. STS-95 L-0 surface observations.

Temperature	24.9 °C (76.8 °F)
Relative humidity	53%
Sea level pressure	1,015.2 hPa (29.98 inHg)
Wind speed	2.9 m/s (5.6 kt) (1-min average)
Wind direction	16° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi)

### 5.92.3 STS-95 Pad Exposure Period Hourly Meteorological Parameters

Figures 553–558 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-95 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 188. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 398.

Table 188. STS-95 pad exposure period hourly extremes.

Minimum temperature	18.3 °C (65 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	53%
Maximum relative humidity	100%
Minimum sea level pressure	1,010.1 hPa (29.83 inHg)
Maximum sea level pressure	1,025.4 hPa (30.28 inHg)
Maximum wind speed and associated wind direction	17.5 m/s (34 kt) 5°
Total precipitation	60.2 mm (2.37 in)

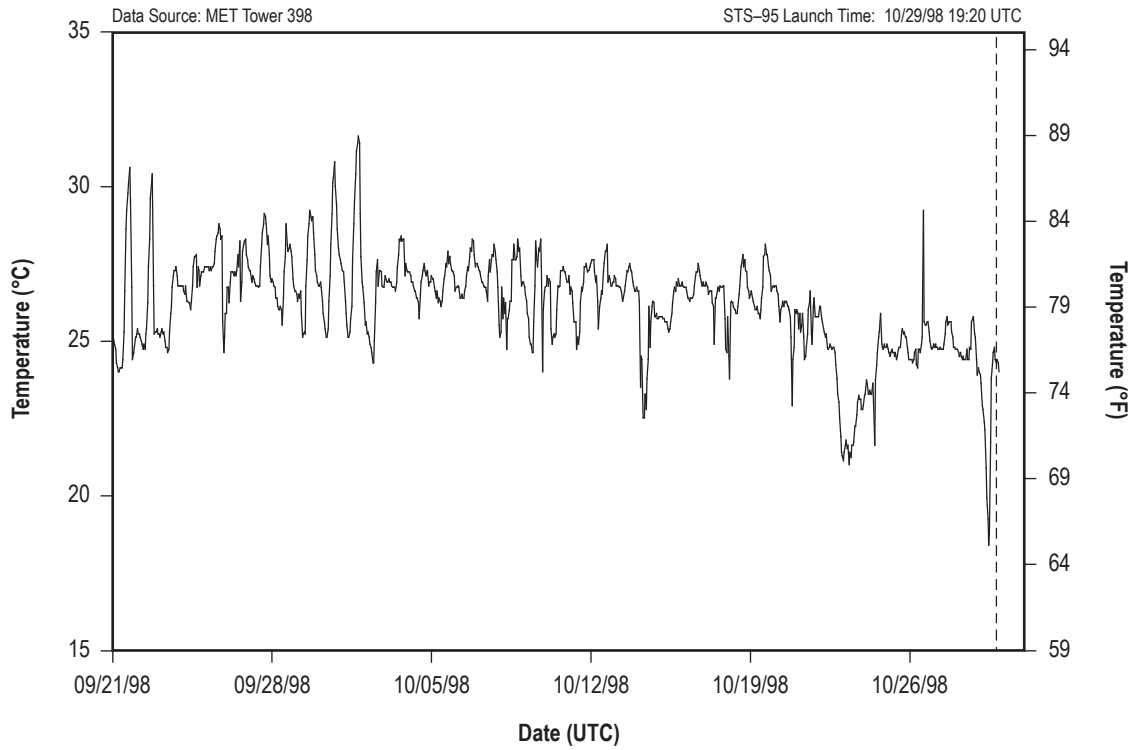


Figure 553. STS-95 hourly surface temperature.

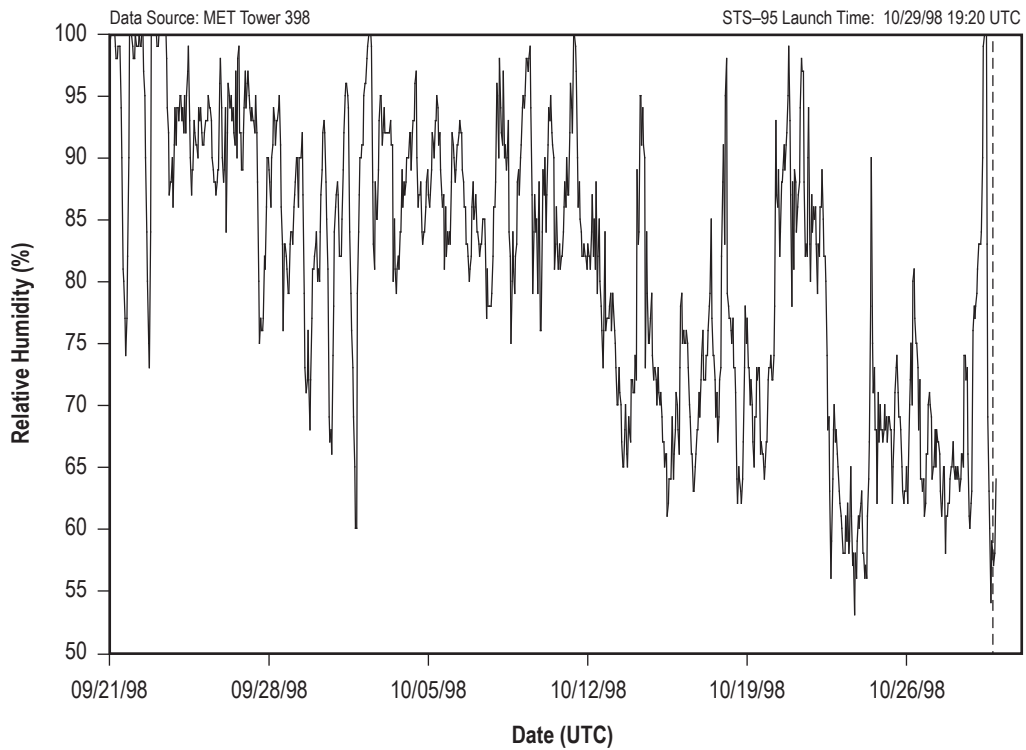


Figure 554. STS-95 hourly surface relative humidity.

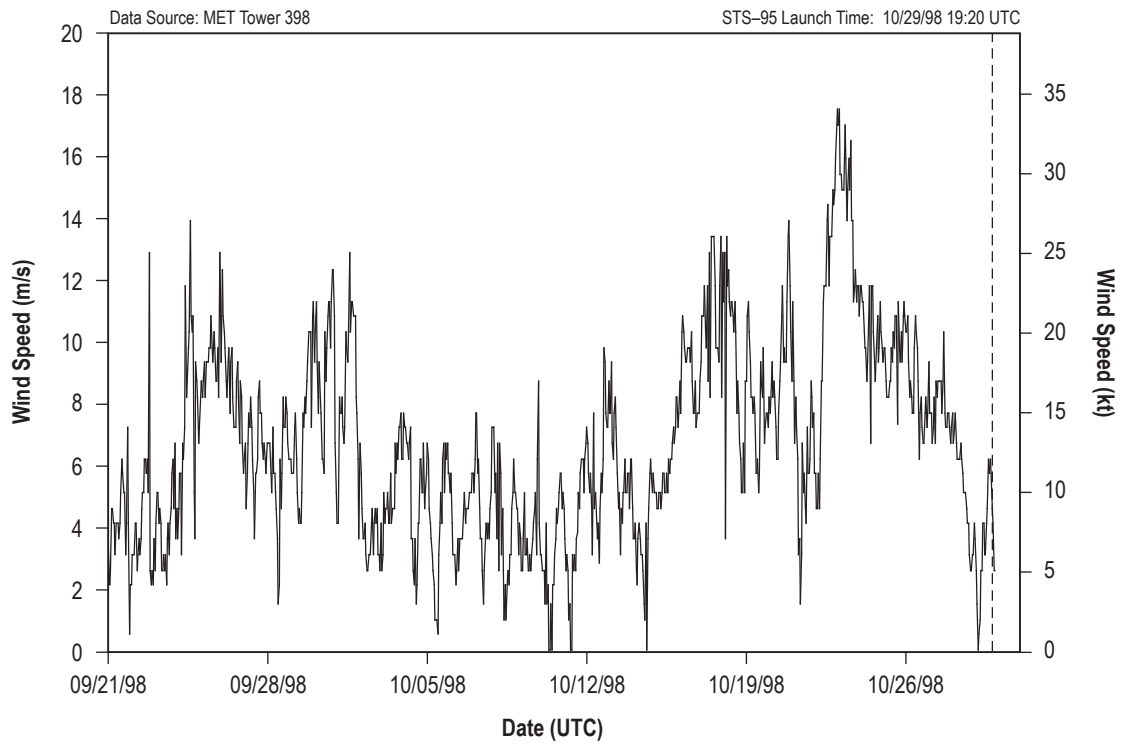


Figure 555. STS-95 hourly surface wind speed.

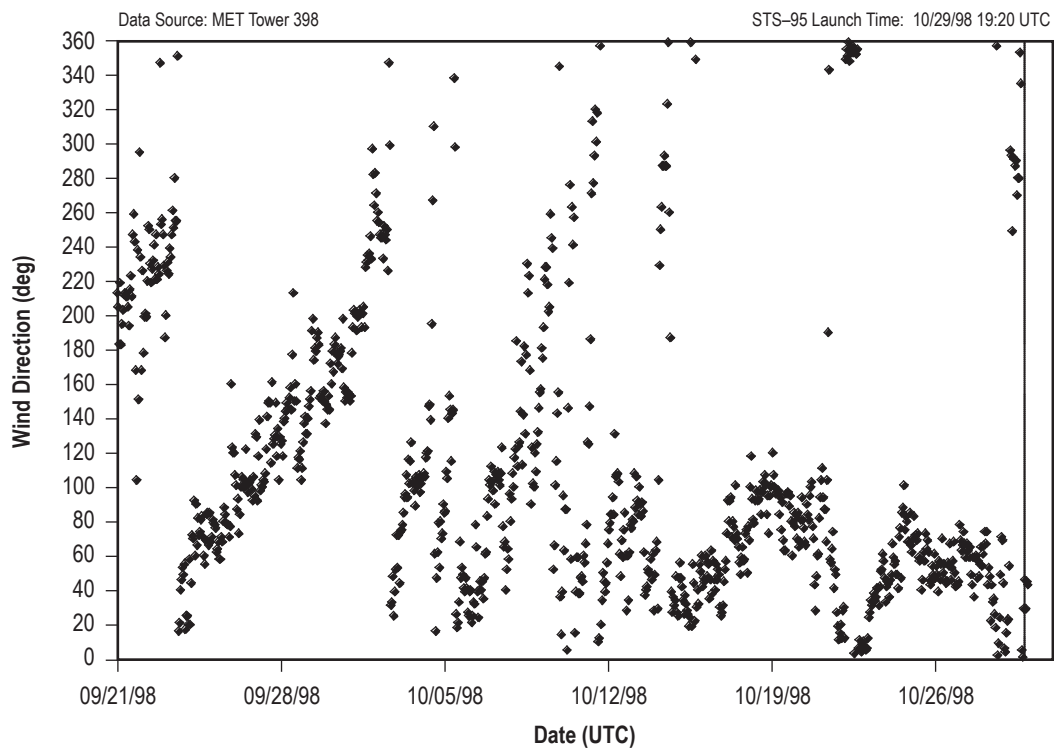


Figure 556. STS-95 hourly surface wind direction.



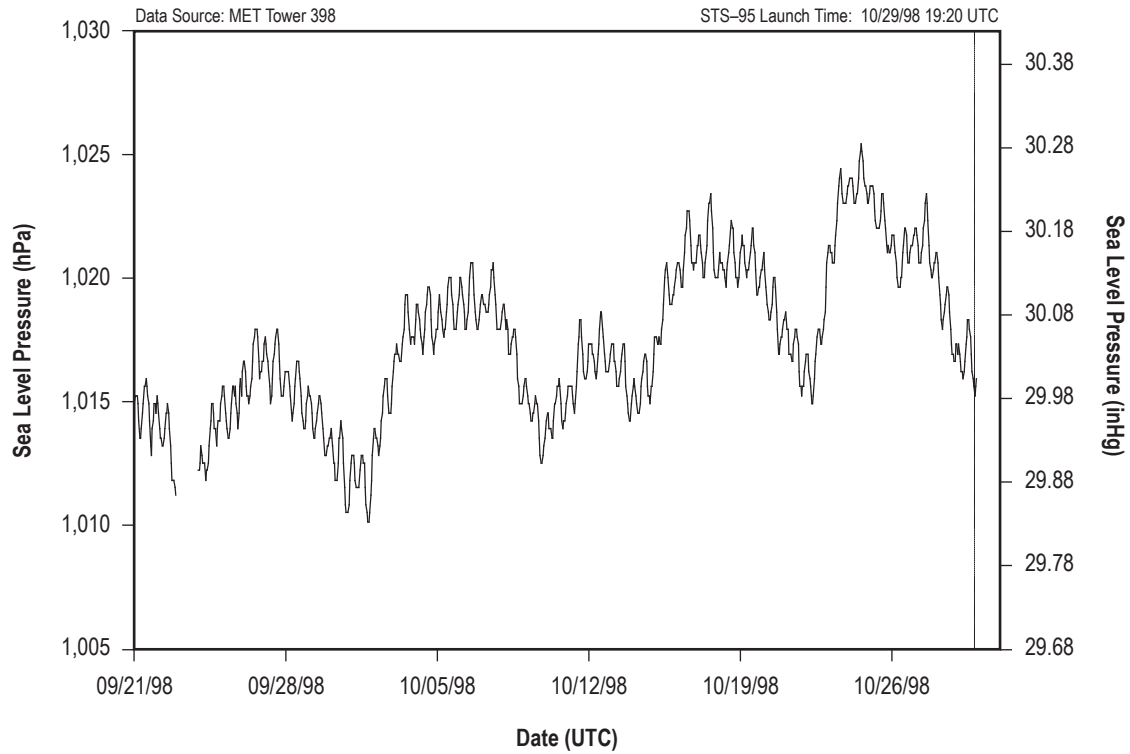


Figure 557. STS-95 hourly sea level pressure.

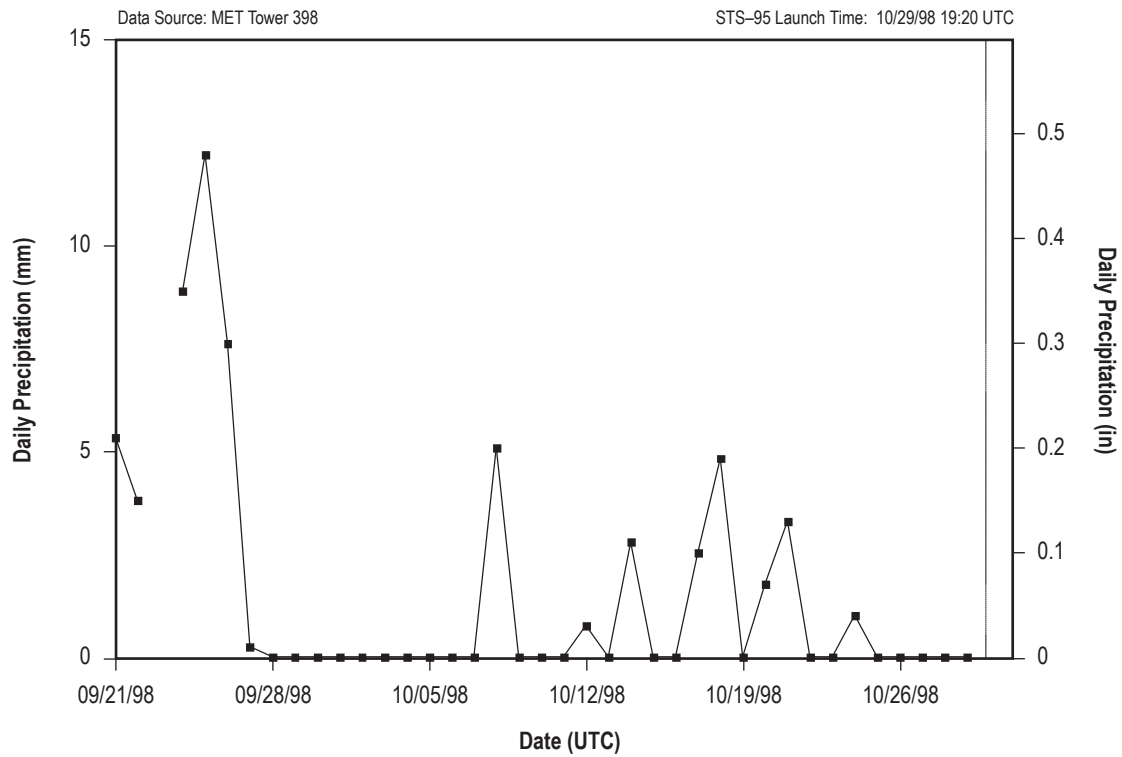


Figure 558. STS-95 daily precipitation totals.

### 5.93 STS–88

STS–88 was the 13th mission for *Endeavour* (OV–105). It rolled out to pad 39A on October 21, 1998. STS–88 was exposed on the pad for 44 days and launched on December 4, 1998, at 08:36 UTC.

#### 5.93.1 STS–88 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–88 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

#### 5.93.2 STS–88 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–88 are shown in table 189. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 189. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 189. STS–88 L–0 surface observations.

Temperature	22.2 °C (72 °F)
Relative humidity	83%
Sea level pressure	1,020.1 hPa (30.12 inHg)
Wind speed	3.4 m/s (6.7 kt) (1-min average)
Wind direction	133° (1-min average)
Sky condition	1/8 cumulus at 945 m (3,100 ft); 1/8 stratuscumulus at 1,524 m (5,000 ft)
Visibility	14.5 km (7.8 nmi)

#### 5.93.3 STS–88 Pad Exposure Period Hourly Meteorological Parameters

Figures 559–564 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–88 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 190. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 394.

Table 190. STS–88 pad exposure period hourly extremes.

Minimum temperature	10.6 °C (51 °F)
Maximum temperature	33.3 °C (92 °F)
Minimum relative humidity	50%
Maximum relative humidity	100%
Minimum sea level pressure	1,000.6 hPa (29.55 inHg)
Maximum sea level pressure	1,026.7 hPa (30.32 inHg)
Maximum wind speed and associated wind direction	21.6 m/s (42 kt) 352°
Total precipitation	117.8 mm (4.64 in)

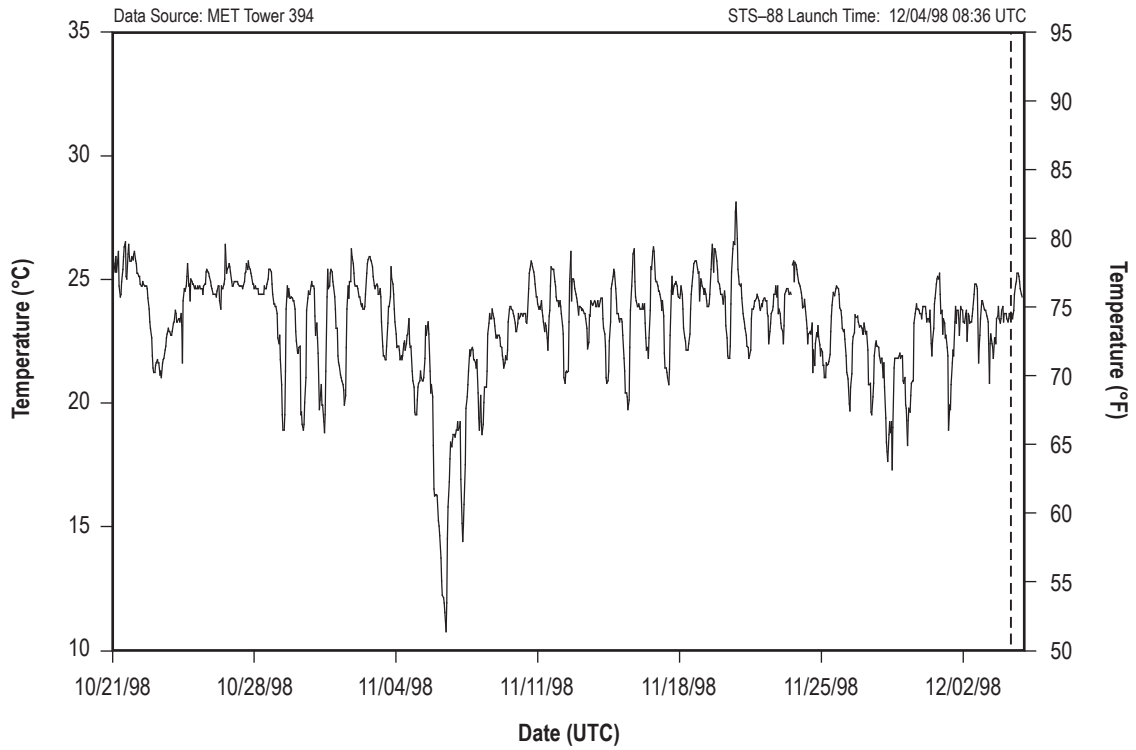


Figure 559. STS-88 hourly surface temperature.

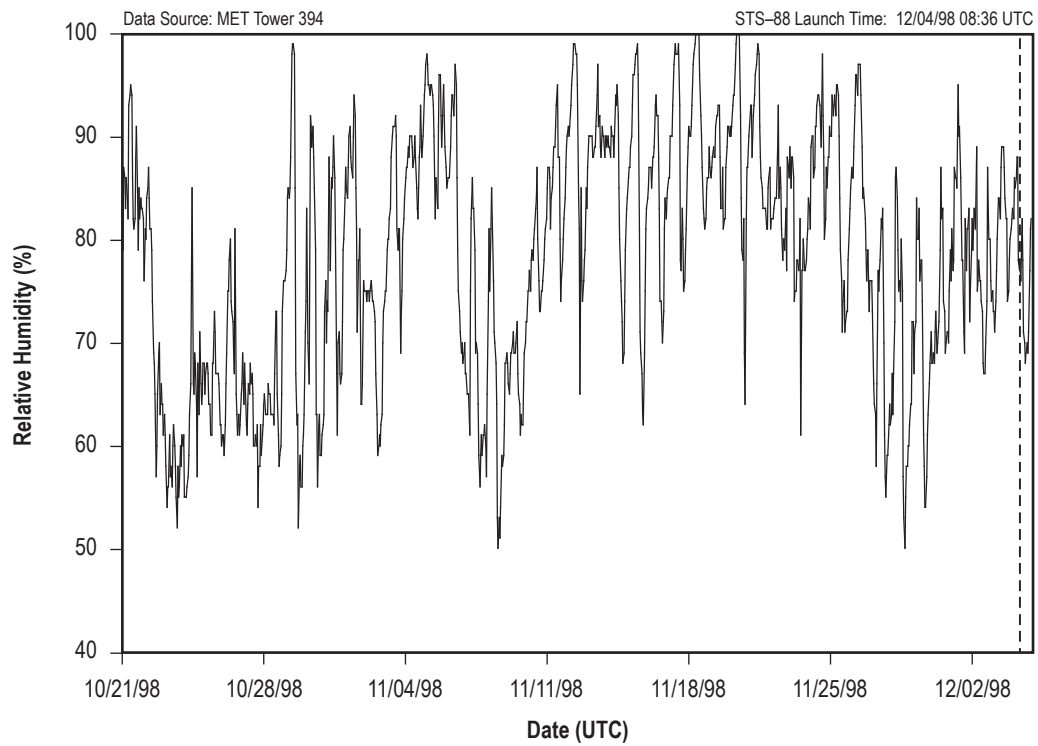


Figure 560. STS-88 hourly surface relative humidity.

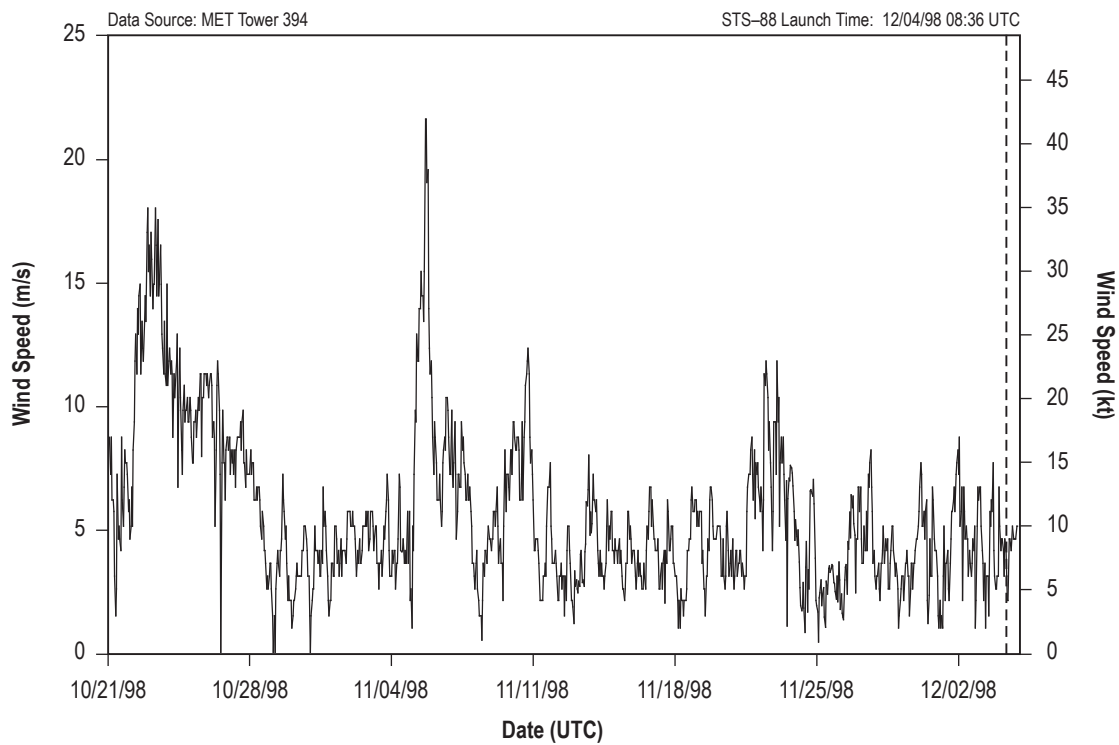


Figure 561. STS-88 hourly surface wind speed.

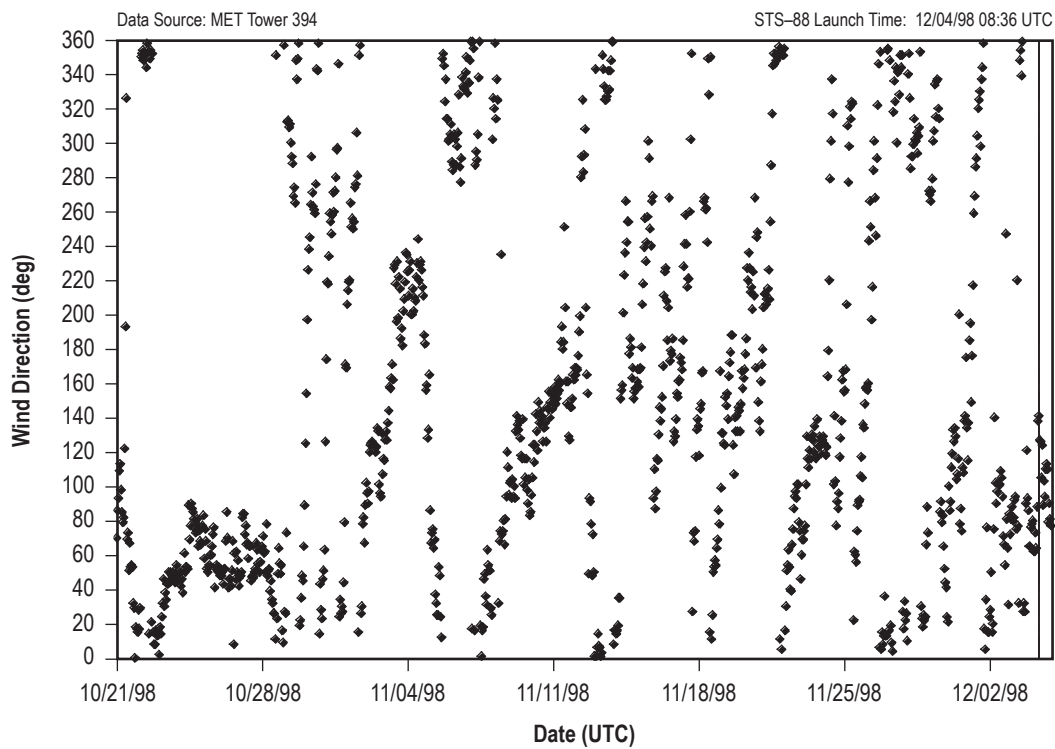


Figure 562. STS-88 hourly surface wind direction.

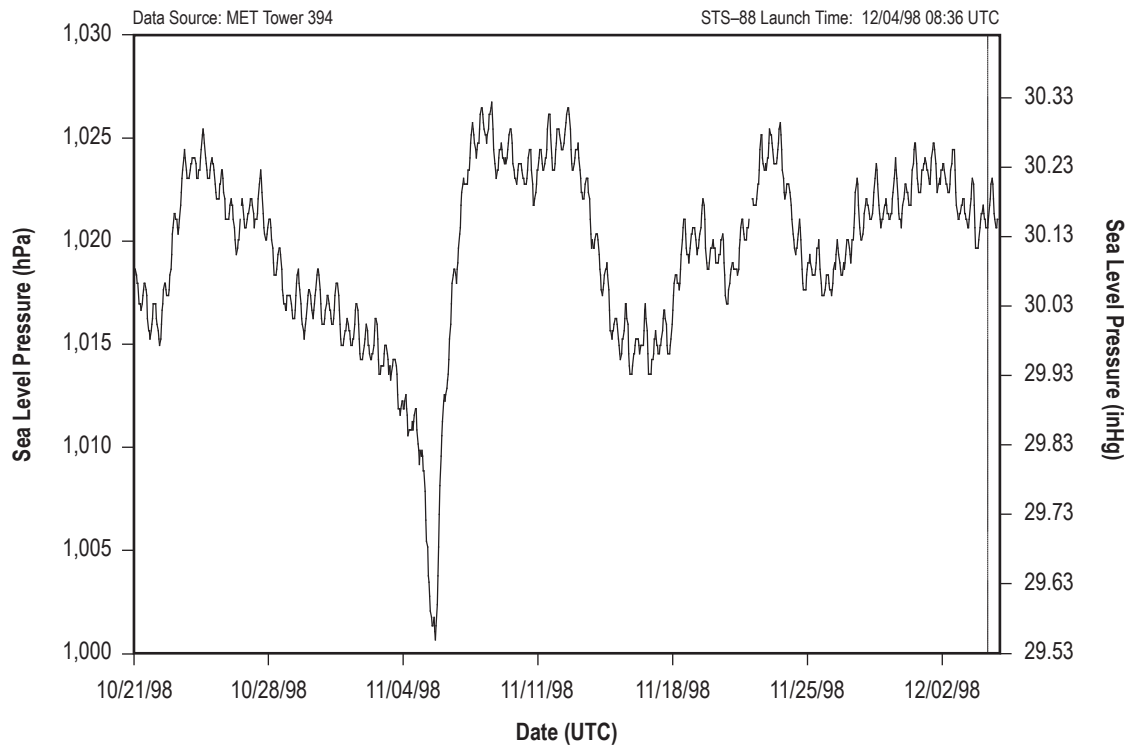


Figure 563. STS-88 hourly sea level pressure.

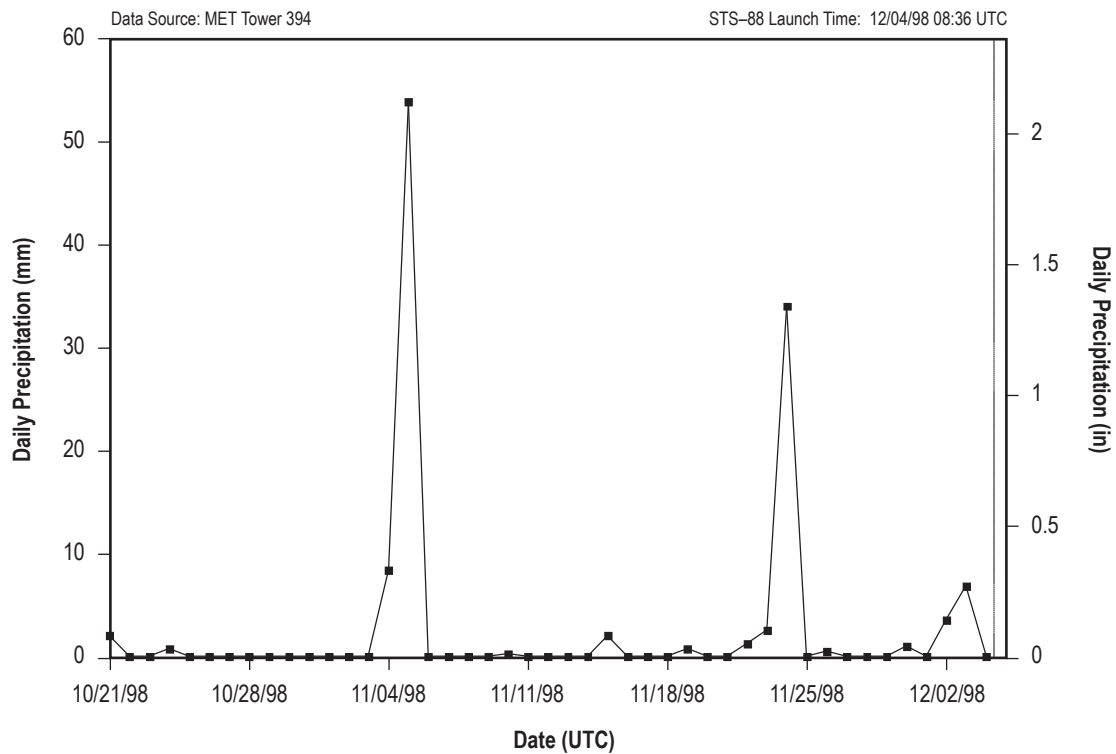


Figure 564. STS-88 daily precipitation totals.

## 5.94 STS-96

STS-96 was the 26th mission for *Discovery* (OV-103). It rolled out to pad 39B the first time on April 23, 1999. It was rolled back from the pad on May 16, 1999. STS-96 rolled out to pad 39B the second time on May 20, 1999. STS-96 was exposed on the pad for a total of 31 days (24 days after the first rollout and 7 days after the second rollout) and launched on May 27, 1999, at 10:50 UTC.

### 5.94.1 STS-96 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-96 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.94.2 STS-96 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-96 are shown in table 191. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 191. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 191. STS-96 L-0 surface observations.

Temperature	20.9 °C (69.6 °F)
Relative humidity	96%
Sea level pressure	1,016.7 hPa (30.02 inHg)
Wind speed	2.9 m/s (5.7 kt) (1-min average)
Wind direction	235° (1-min average)
Sky condition	1/8 cumulus at 600 m (1,968 ft); 1/8 stratocumulus at 1,500 m (4,921 ft); 6/8 cirrus at 6,300 m (20,669 ft)
Visibility	11.3 km (6.1 nmi)

### 5.94.3 STS-96 Pad Exposure Period Hourly Meteorological Parameters

Figures 565–570 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-96 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 192. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 398.

Table 192. STS-96 pad exposure period hourly extremes.

Minimum temperature	11.7 °C (53 °F)
Maximum temperature	30.6 °C (87 °F)
Minimum relative humidity	49%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.8 hPa (29.76 inHg)
Maximum sea level pressure	1,022 hPa (30.18 inHg)
Maximum wind speed and associated wind direction	17.5 m/s (34 kt) 197°
Total precipitation	43.2 mm (1.7 in)

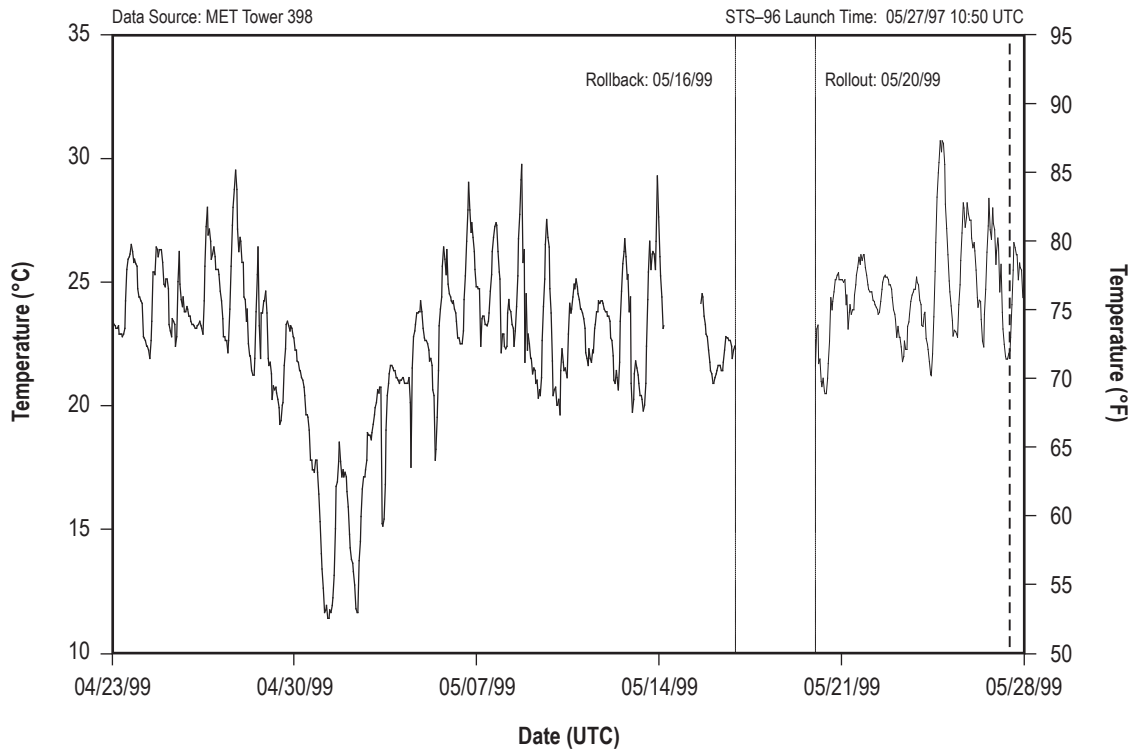


Figure 565. STS-96 hourly surface temperature.

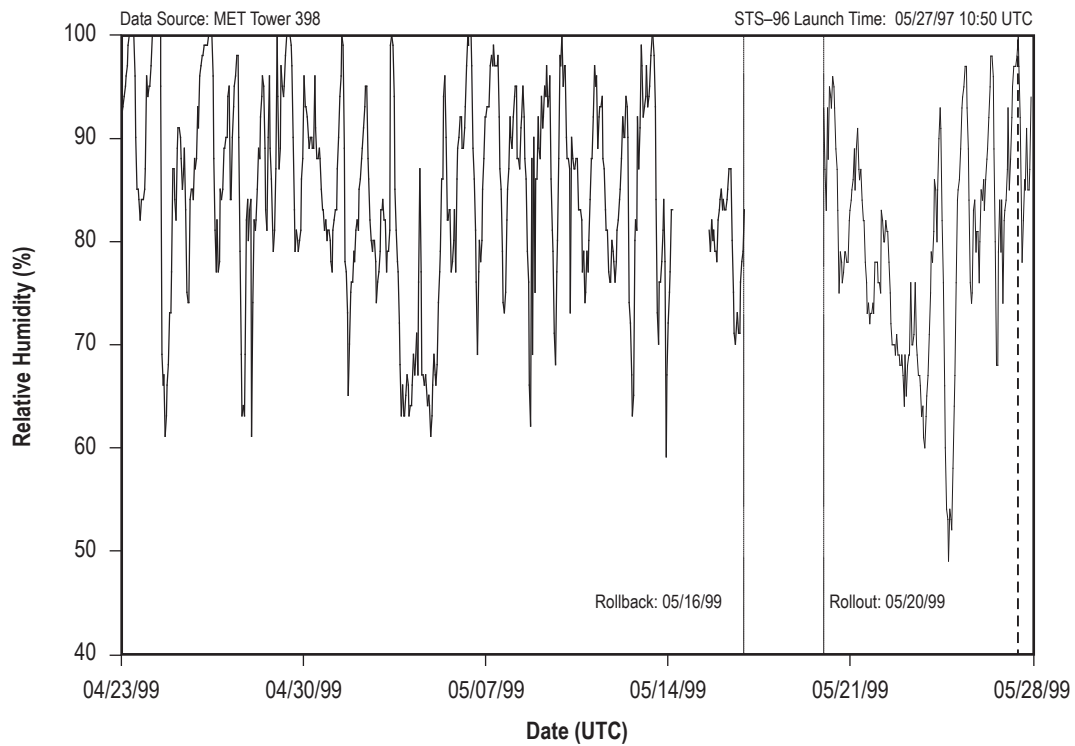


Figure 566. STS-96 hourly surface relative humidity.

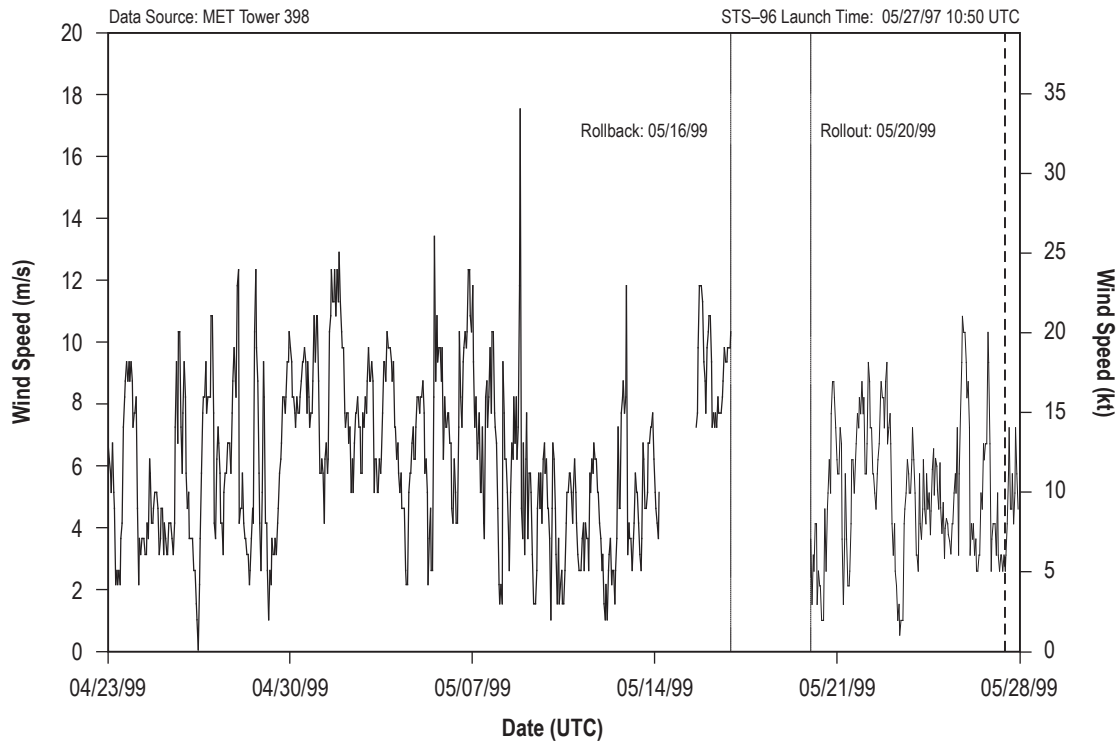


Figure 567. STS-96 hourly surface wind speed.

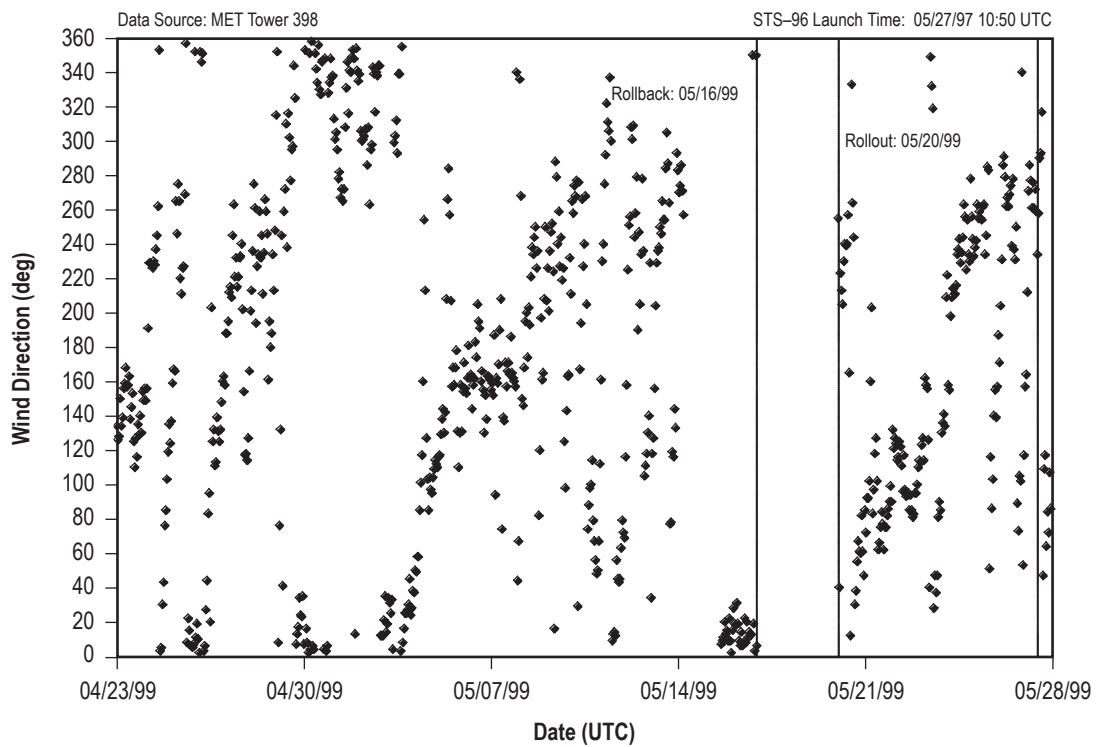


Figure 568. STS-96 hourly surface wind direction.



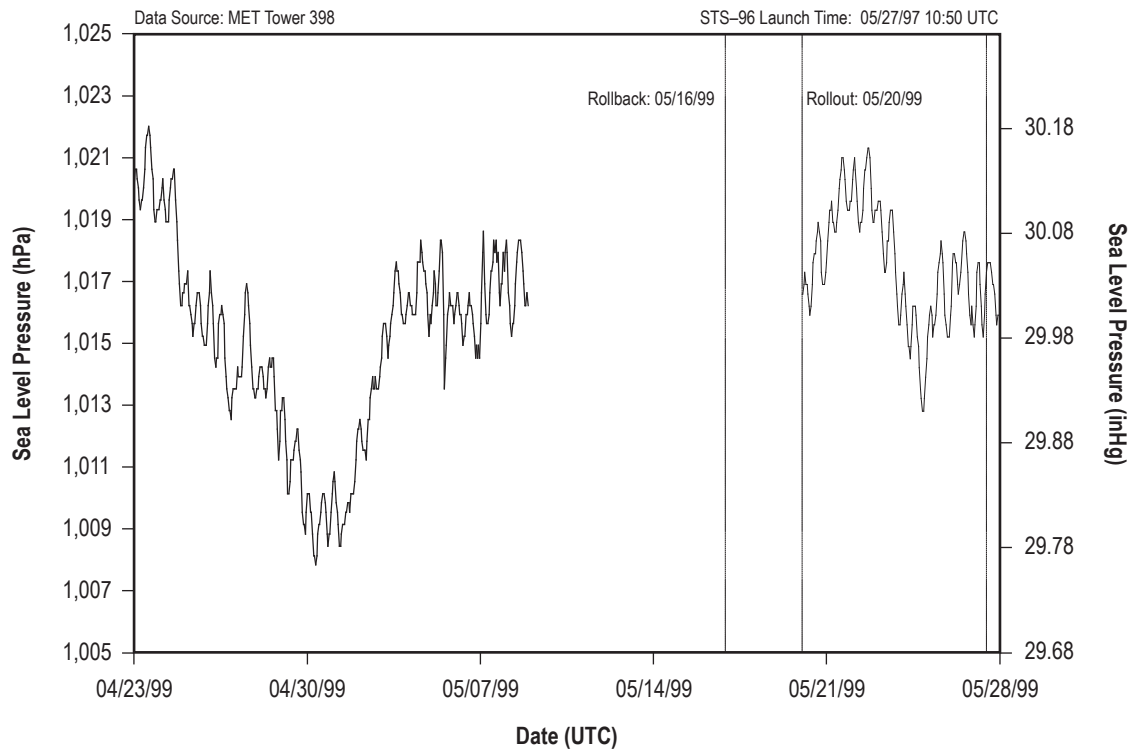


Figure 569. STS-96 hourly sea level pressure.

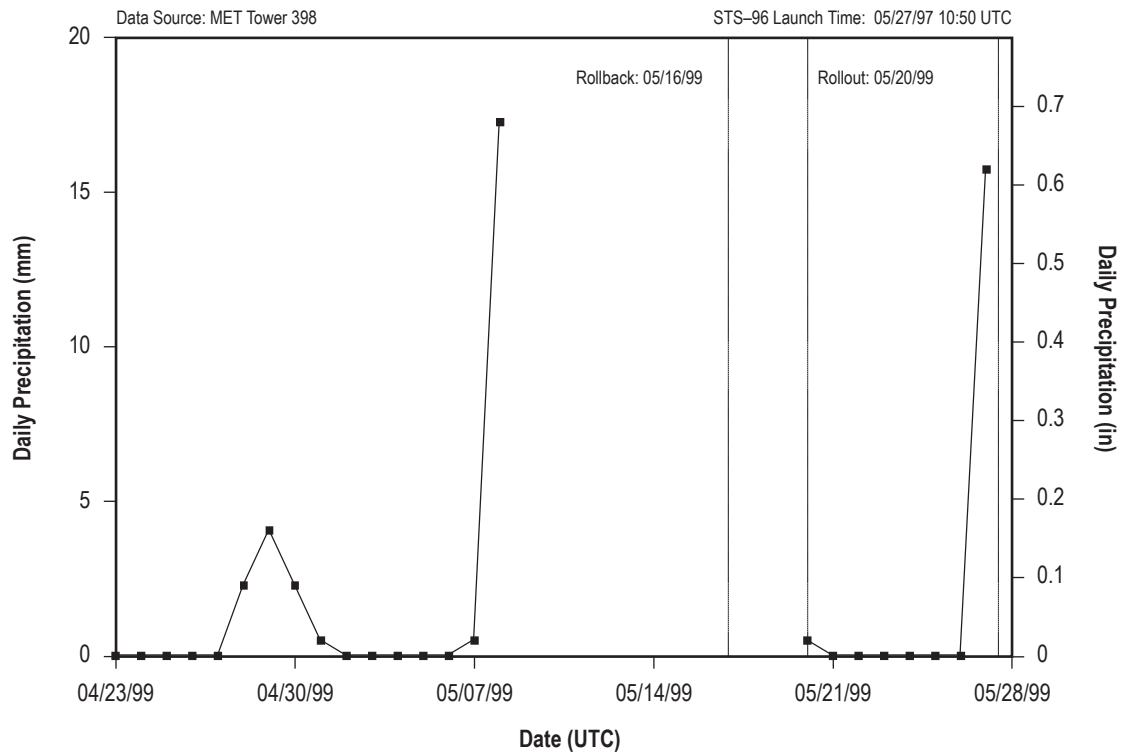


Figure 570. STS-96 daily precipitation totals.

## 5.95 STS–93

STS–93 was the 26th mission for *Columbia* (OV–102). It rolled out to pad 39B on June 7, 1999. STS–93 was exposed on the pad for 46 days and launched on July 23, 1999, at 04:31 UTC.

### 5.95.1 STS–93 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–93 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.95.2 STS–93 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–93 are shown in table 193. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 193. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 193. STS–93 L–0 surface observations.

Temperature	25.6 °C (78 °F)
Relative humidity	89%
Sea level pressure	1,017.3 hPa (30.04 inHg)
Wind speed	1.4 m/s (2.7 kt) (1-min average)
Wind direction	233° (1-min average)
Sky condition	2/8 cirrus at 7,500 m (24,606 ft)
Visibility	12.9 km (6.9 nmi)

### 5.95.3 STS–93 Pad Exposure Period Hourly Meteorological Parameters

Figures 571–576 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–93 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 194. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 398.

Table 194. STS–93 pad exposure period hourly extremes.

Minimum temperature	21.1 °C (70 °F)
Maximum temperature	31.1 °C (88 °F)
Minimum relative humidity	57%
Maximum relative humidity	100%
Minimum sea level pressure	1,014.2 hPa (29.95 inHg)
Maximum sea level pressure	1,023.7 hPa (30.23 inHg)
Maximum wind speed and associated wind direction	14.4 m/s (28 kt) 33°
Total precipitation	155.2 mm (6.11 in)

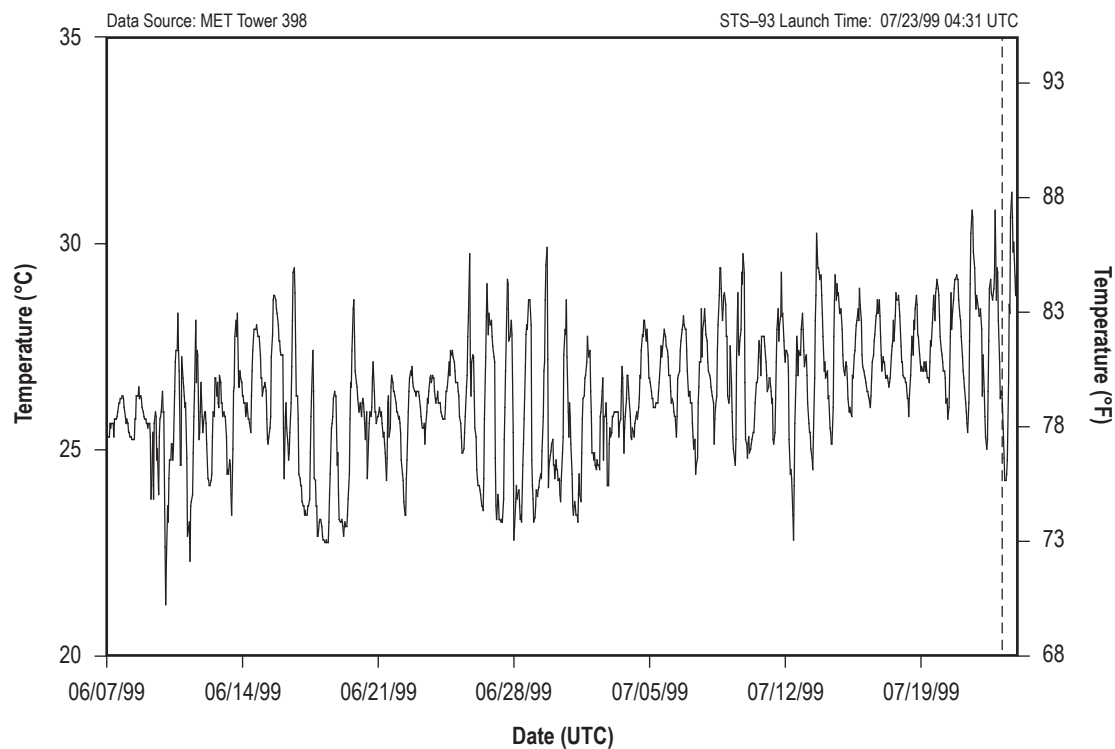


Figure 571. STS-93 hourly surface temperature.

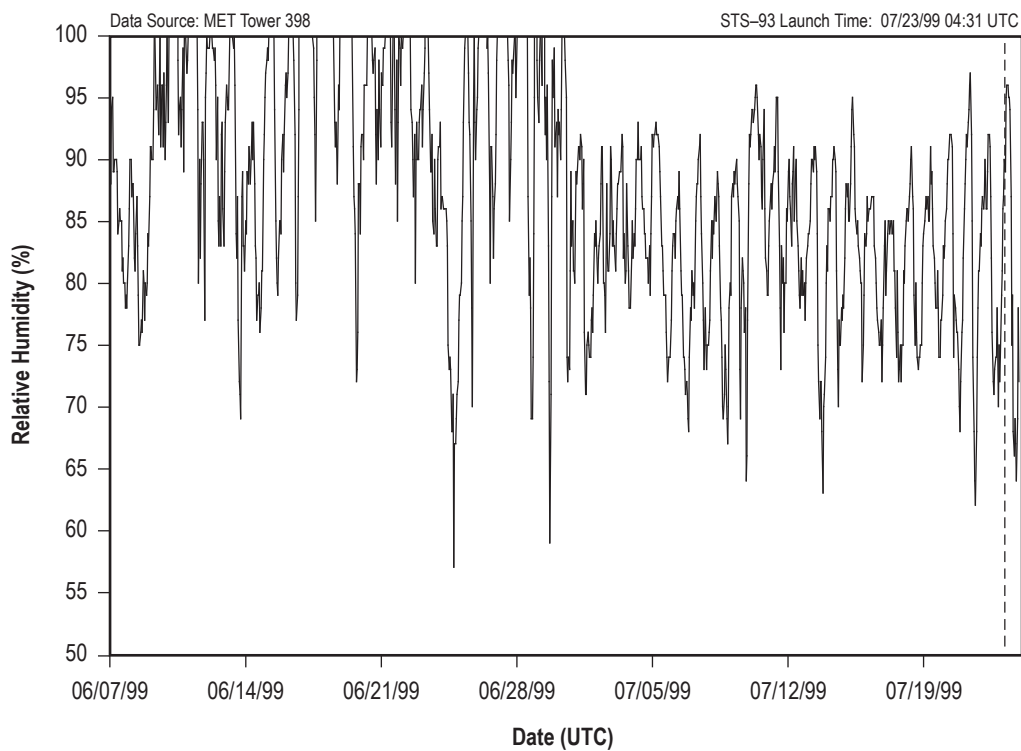


Figure 572. STS-93 hourly surface relative humidity.

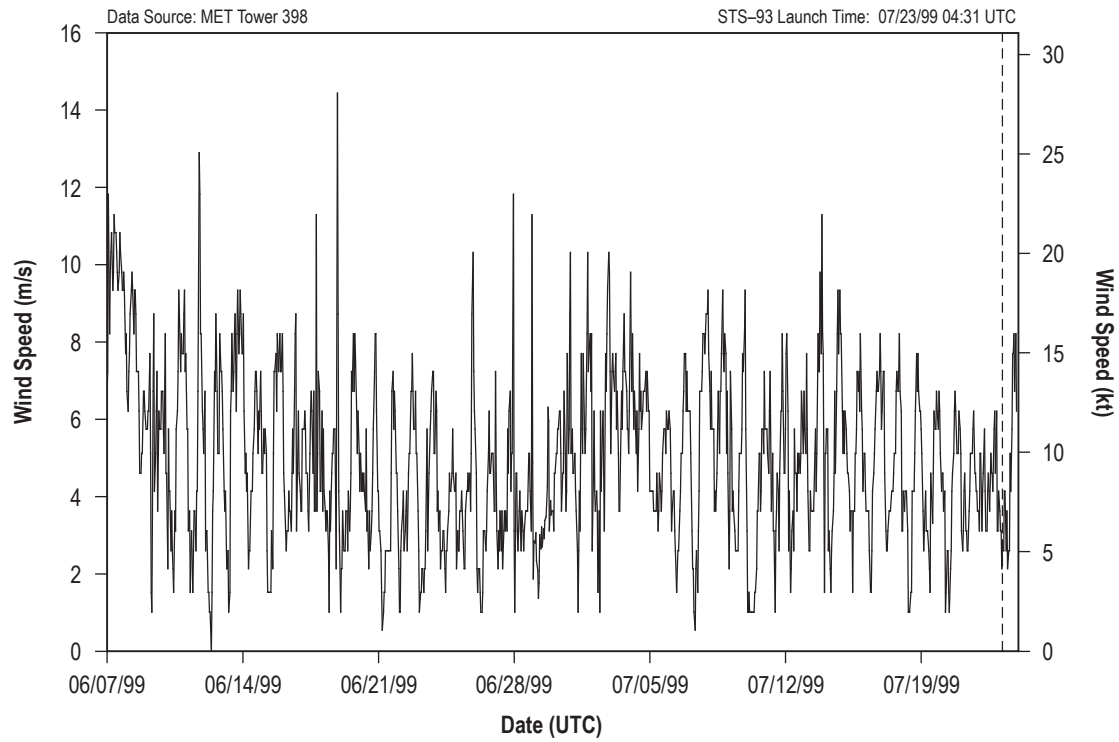


Figure 573. STS-93 hourly surface wind speed.

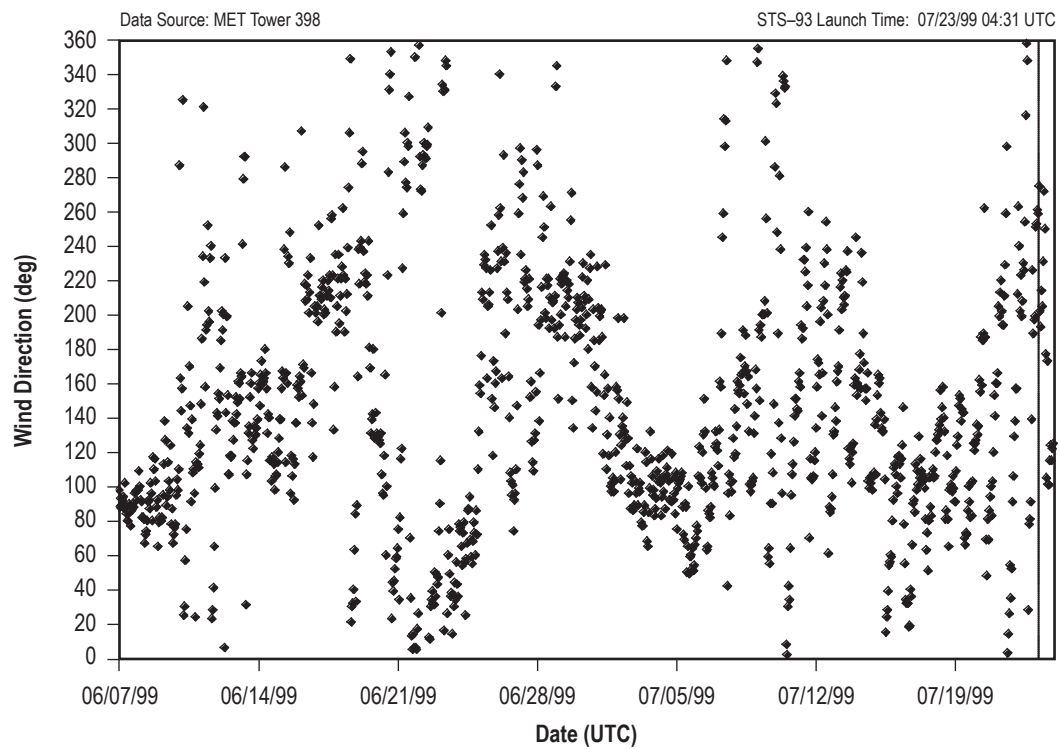


Figure 574. STS-93 hourly surface wind direction.

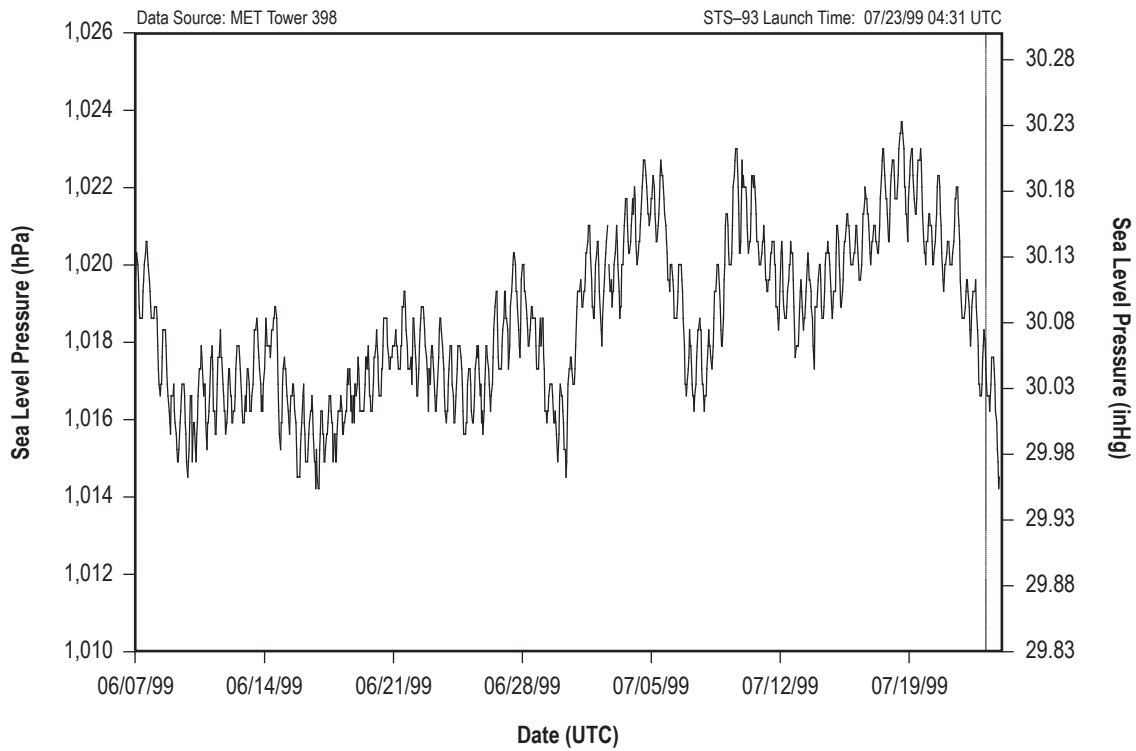


Figure 575. STS-93 hourly sea level pressure.

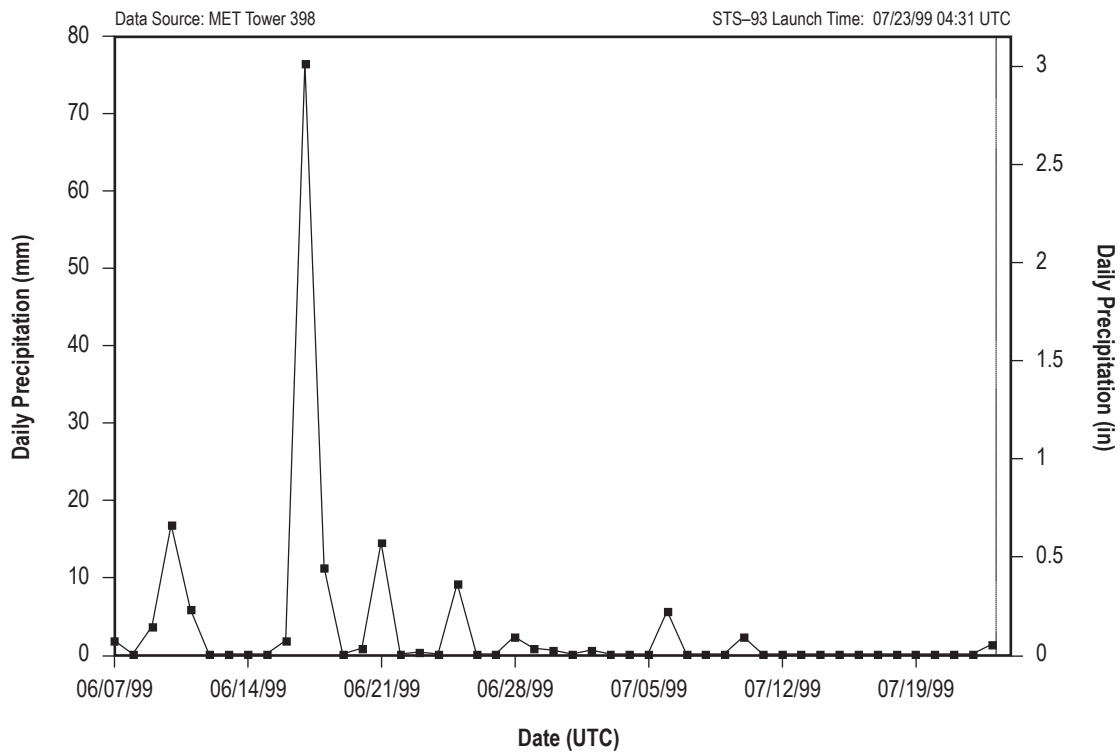


Figure 576. STS-93 daily precipitation totals.

## 5.96 STS–103

STS–103 was the 27th mission for *Discovery* (OV–103). It rolled out to pad 39B on November 13, 1999. STS–103 was exposed on the pad for 37 days and launched on December 20, 1999, at 00:50 UTC.

### 5.96.1 STS–103 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–103 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.96.2 STS–103 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–103 are shown in table 195. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 195. Wind speed and wind direction were obtained from pad 39B, camera site 6 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 195. STS–103 L–0 surface observations.

Temperature	18.9 °C (66 °F)
Relative humidity	74%
Sea level pressure	1,016.7 hPa (30.02 inHg)
Wind speed	2.7 m/s (5.2 kt) (1-min average)
Wind direction	312° (1-min average)
Sky condition	1/8 cirrostratus at 7,620 m (25,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.96.3 STS–103 Pad Exposure Period Hourly Meteorological Parameters

Figures 577–582 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–103 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 196. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 398.

Table 196. STS–103 pad exposure period hourly extremes.

Minimum temperature	5.6 °C (42 °F)
Maximum temperature	26.7 °C (80 °F)
Minimum relative humidity	47%
Maximum relative humidity	100%
Minimum sea level pressure	1,008.1 hPa (29.77 inHg)
Maximum sea level pressure	1,030.1 hPa (30.42 inHg)
Maximum wind speed and associated wind direction	16.5 m/s (32 kt) 16°
Total precipitation	120.9 mm (4.75 in)

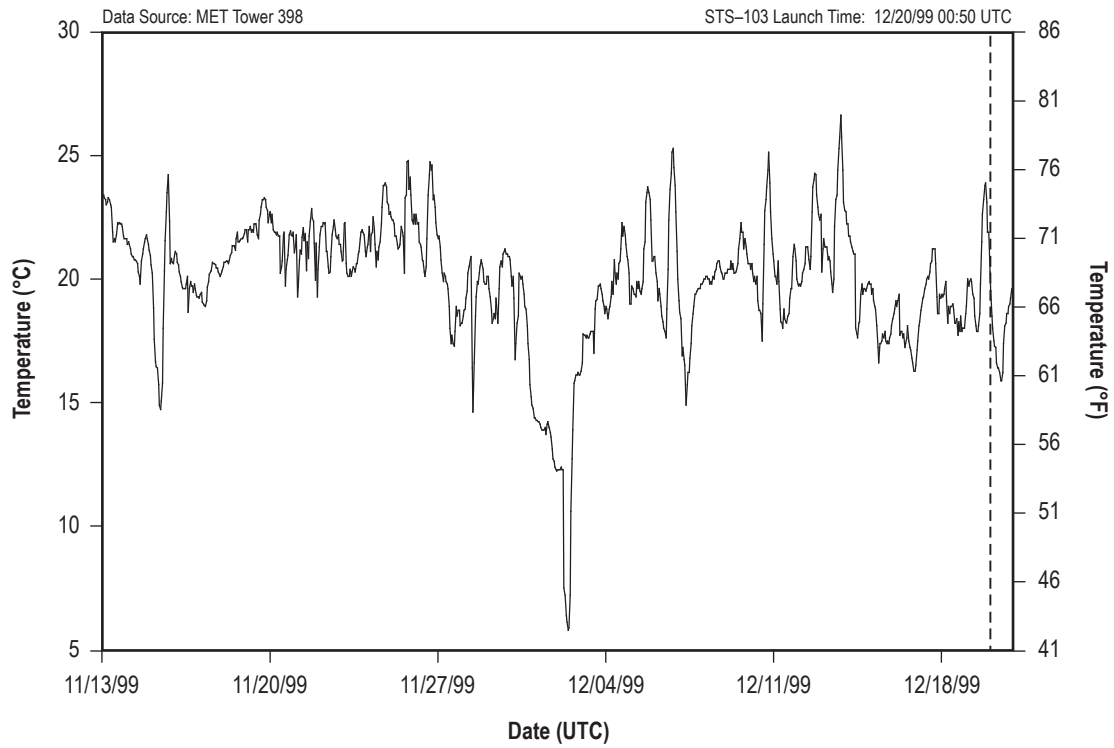


Figure 577. STS-103 hourly surface temperature.

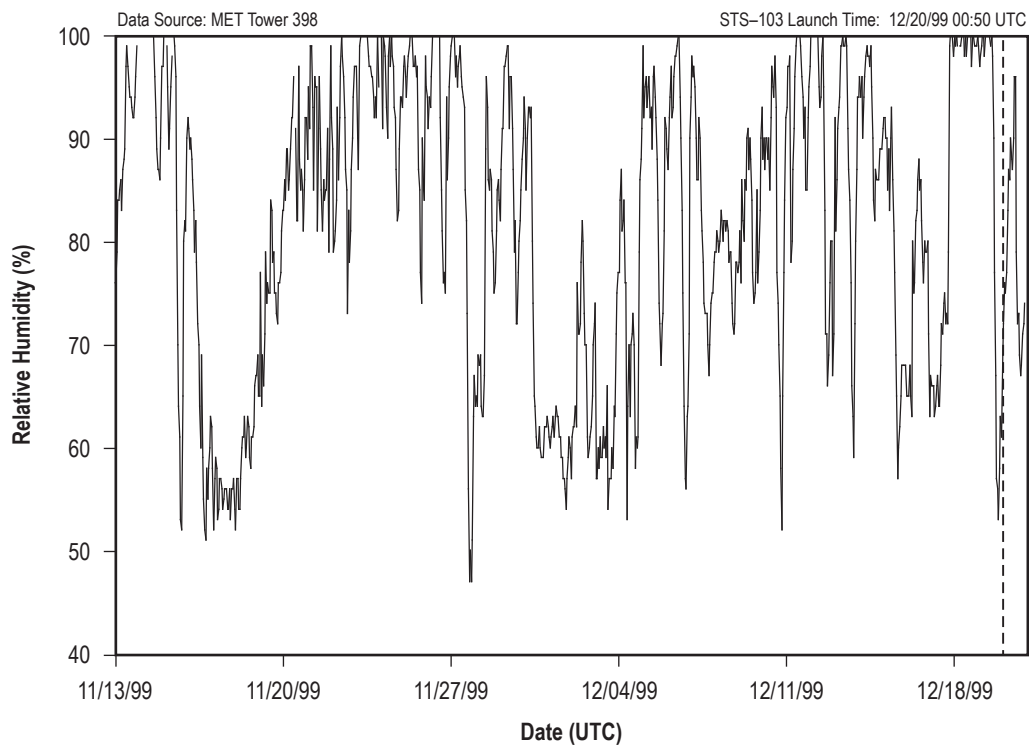


Figure 578. STS-103 hourly surface relative humidity.

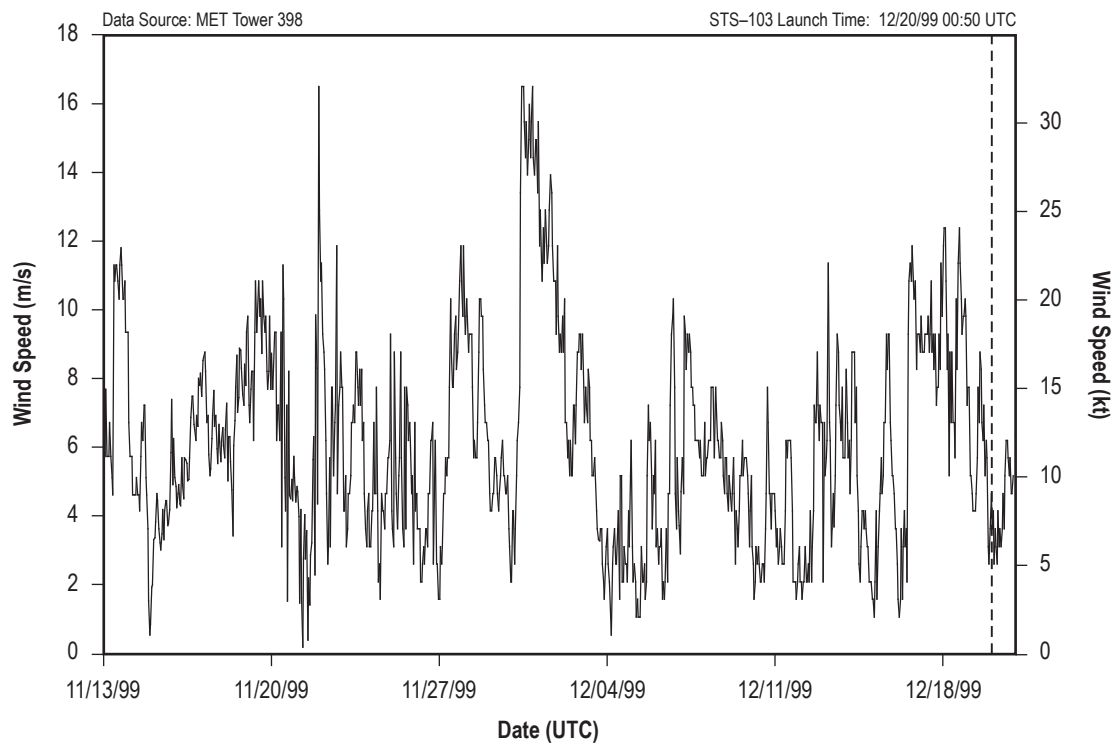


Figure 579. STS-103 hourly surface wind speed.

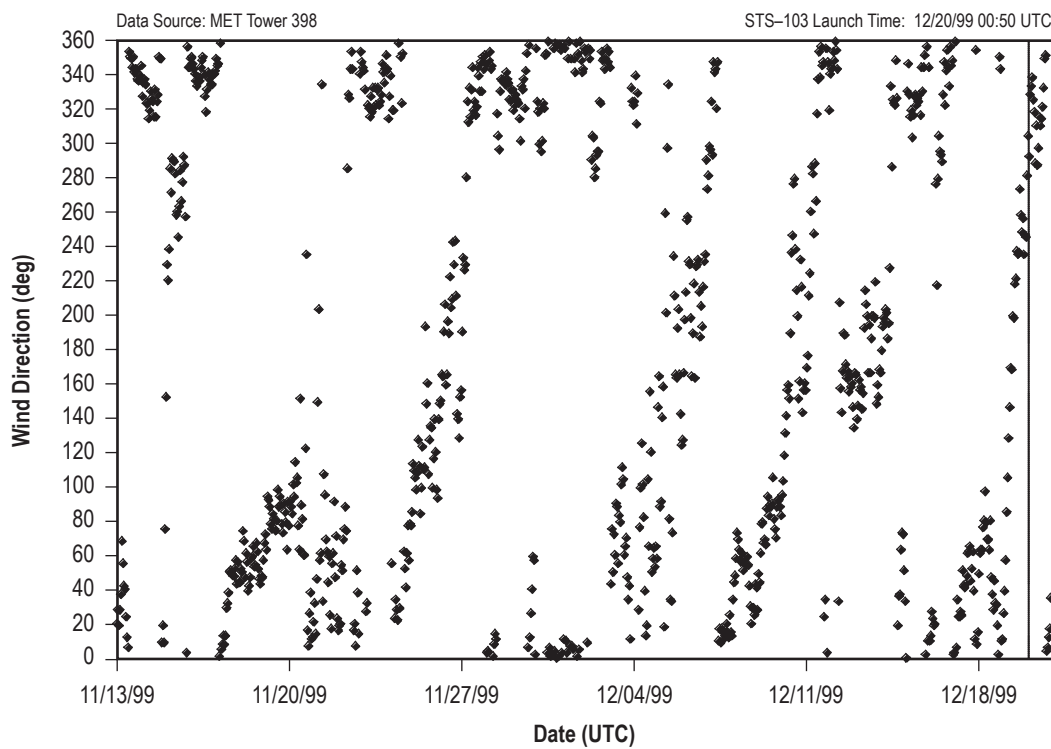


Figure 580. STS-103 hourly surface wind direction.



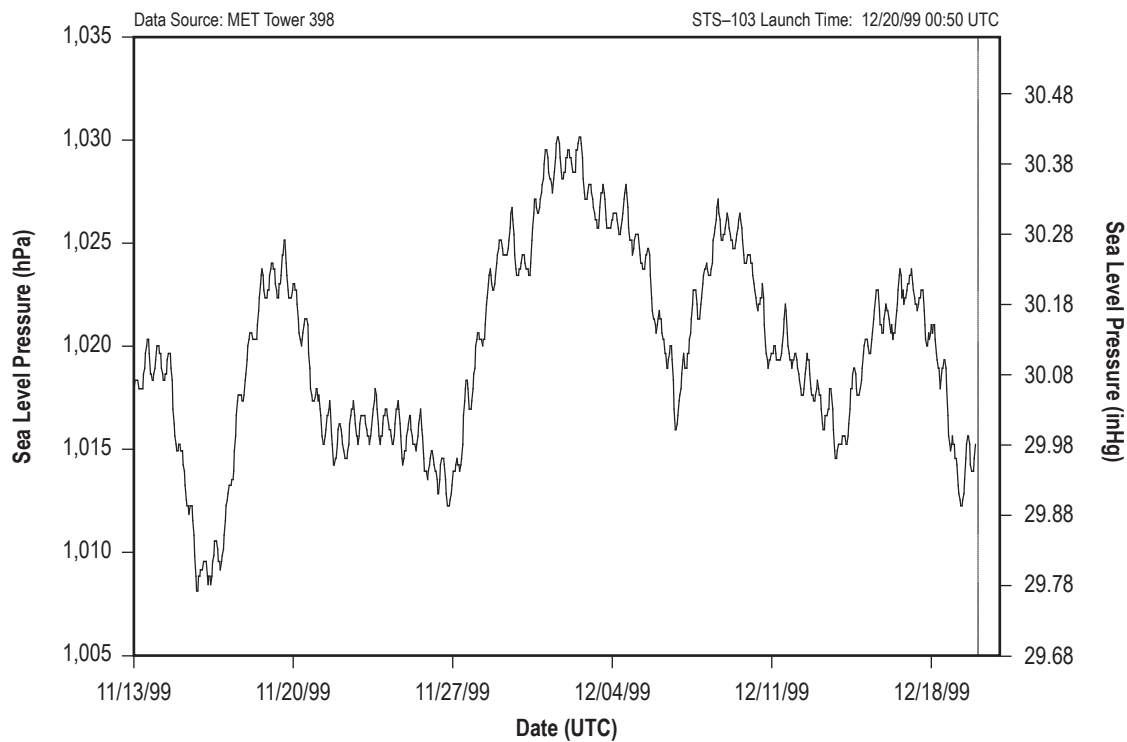


Figure 581. STS-103 hourly sea level pressure.

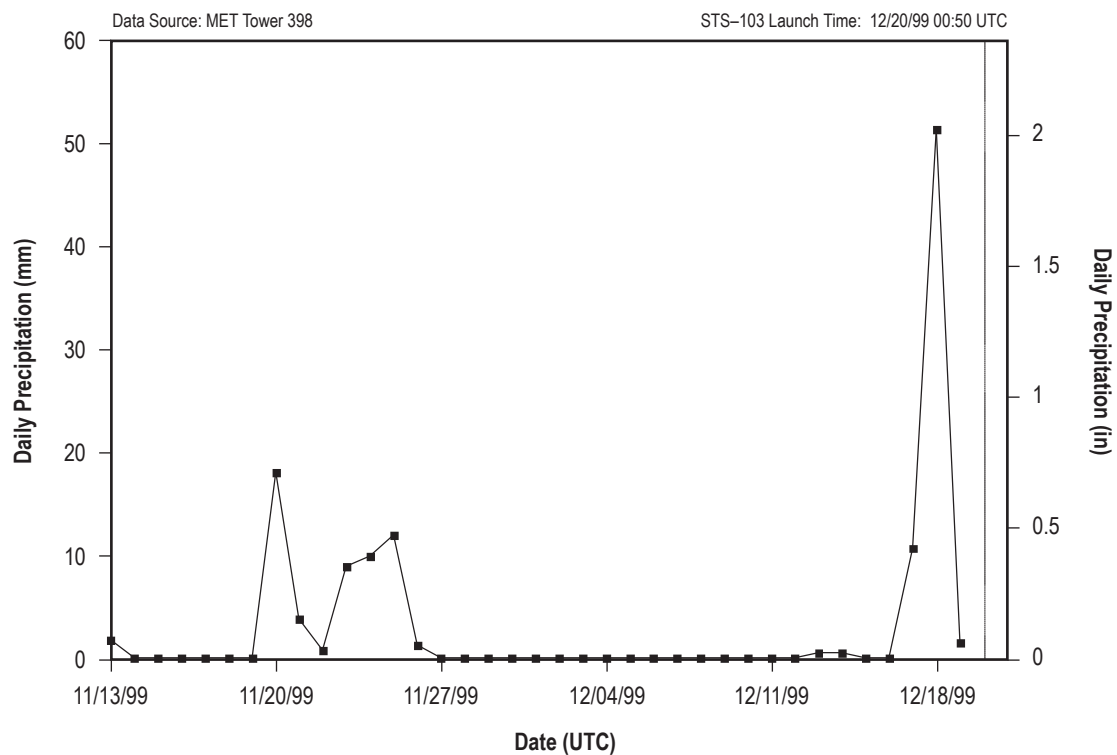


Figure 582. STS-103 daily precipitation totals.

## 5.97 STS–99

STS–99 was the 14th mission for *Endeavour* (OV–105). It rolled out to pad 39A on December 13, 1999. STS–99 was exposed on the pad for 61 days and launched on February 11, 2000, at 17:43 UTC.

### 5.97.1 STS–99 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–99 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.97.2 STS–99 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–99 are shown in table 197. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 197. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 197. STS–99 L–0 surface observations.

Temperature	19.3 °C (66.7 °F)
Relative humidity	60%
Sea level pressure	1,020.7 hPa (30.14 inHg)
Wind speed	5.5 m/s (10.7 kt) (1-min average)
Wind direction	155° (1-min average)
Sky condition	3/8 cumulus at 914 m (3,000 ft)
Visibility	12.9 km (6.9 nmi)

### 5.97.3 STS–99 Pad Exposure Period Hourly Meteorological Parameters

Figures 583–588 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–99 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 198. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation were also measured at MET tower 394.

Table 198. STS–99 pad exposure period hourly extremes.

Minimum temperature	1.1 °C (34 °F)
Maximum temperature	26.1 °C (79 °F)
Minimum relative humidity	29%
Maximum relative humidity	100%
Minimum sea level pressure	1,001.7 hPa (29.58 inHg)
Maximum sea level pressure	1,037.9 hPa (30.65 inHg)
Maximum wind speed and associated wind direction	22.1 m/s (43 kt) 339°
Total precipitation	130.6 mm (5.14 in)

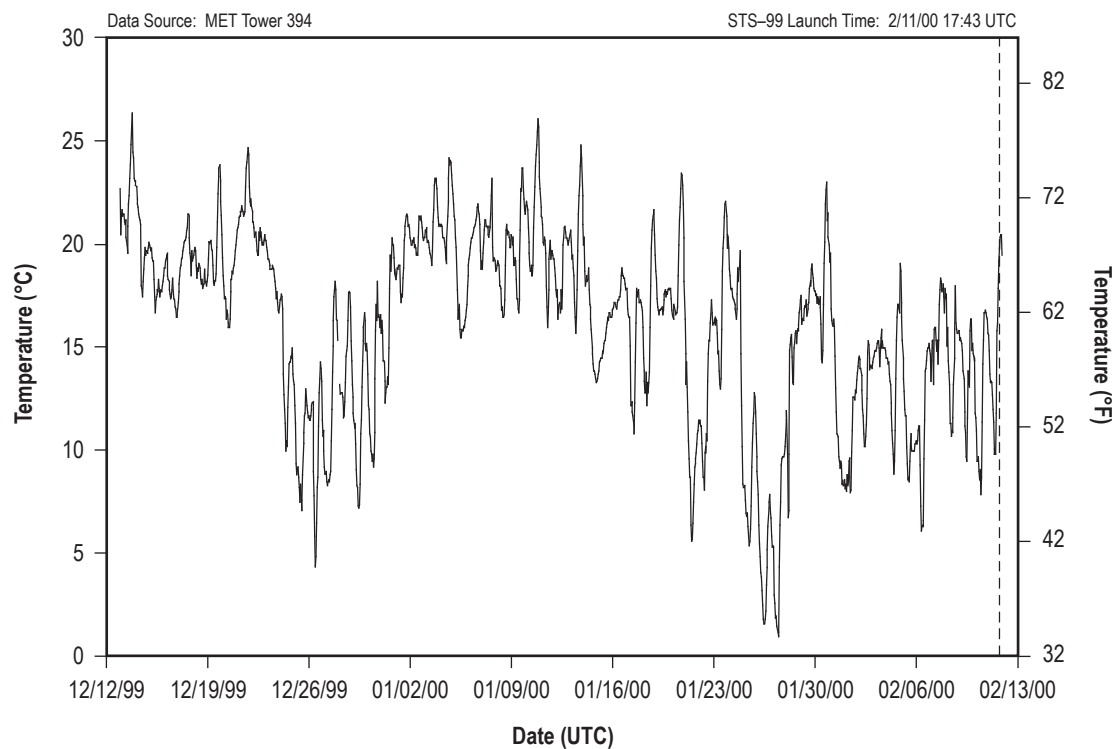


Figure 583. STS-99 hourly surface temperature.

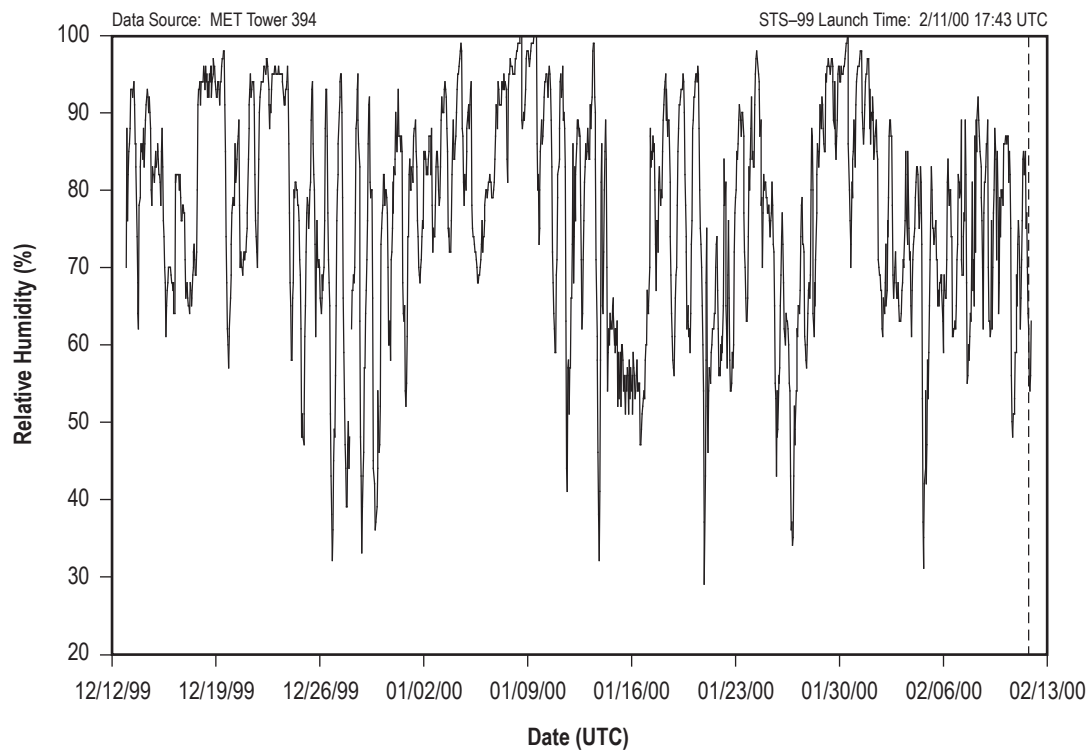


Figure 584. STS-99 hourly surface relative humidity.

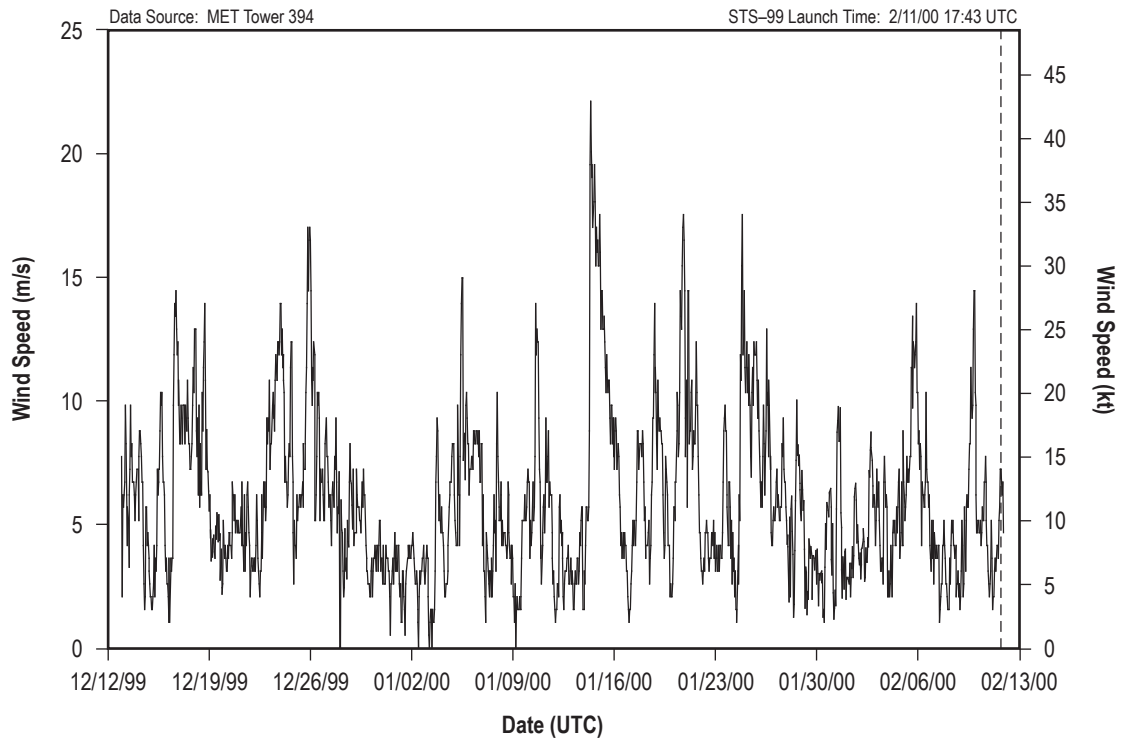


Figure 585. STS-99 hourly surface wind speed.

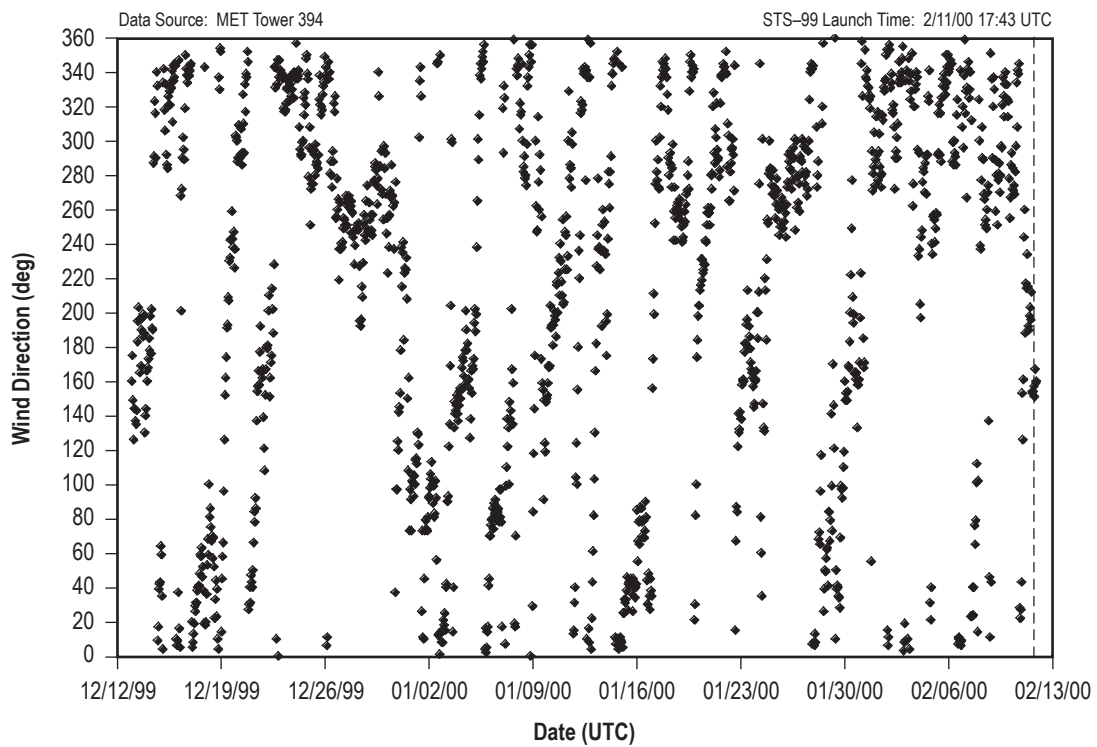


Figure 586. STS-99 hourly surface wind direction.

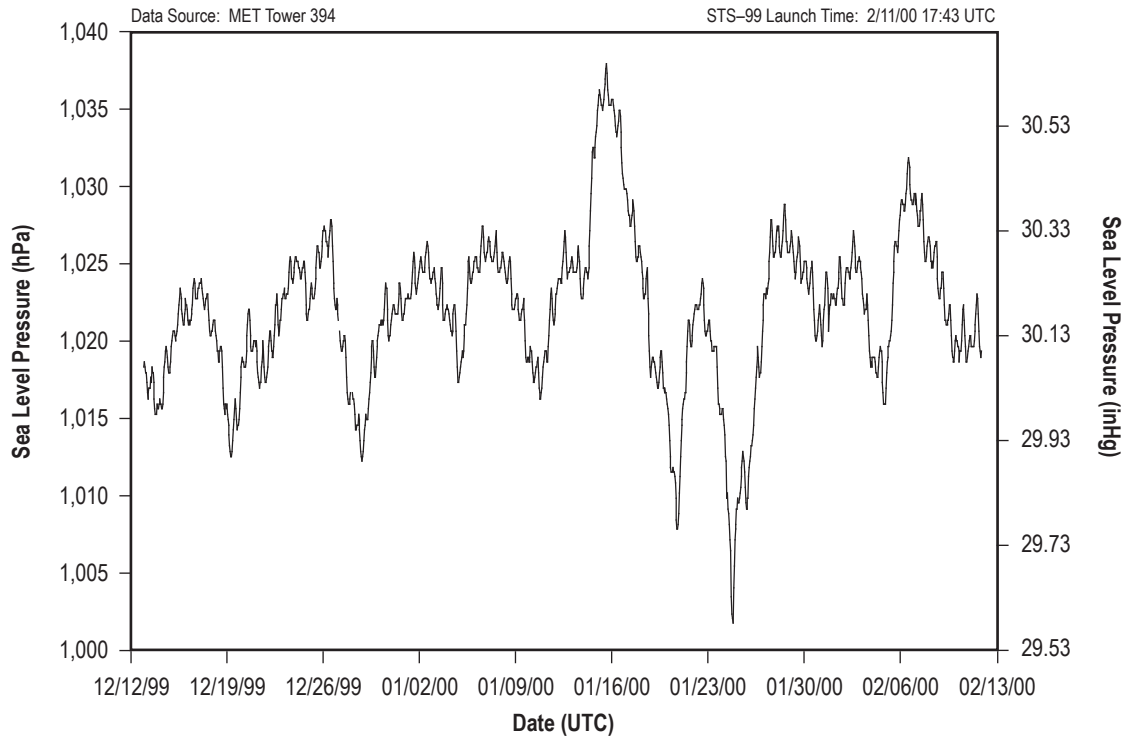


Figure 587. STS-99 hourly sea level pressure.

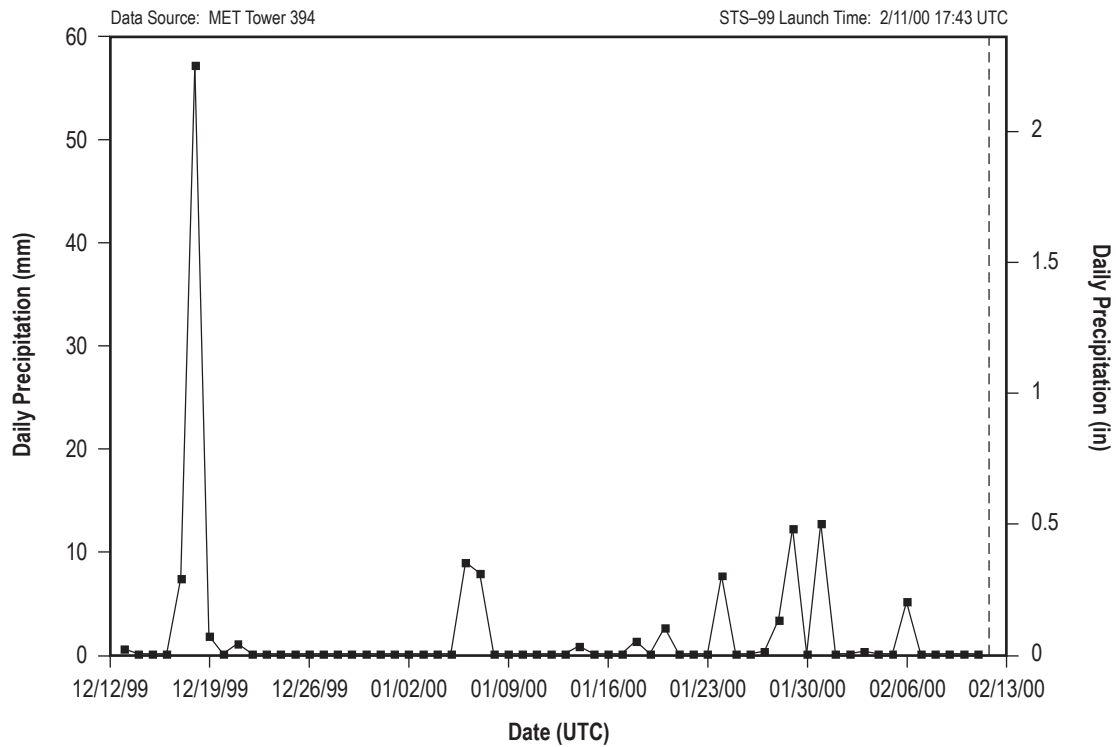


Figure 588. STS-99 daily precipitation totals.

## 5.98 STS-101

STS-101 was the 21st mission for *Atlantis* (OV-104). It rolled out to pad 39A on March 25, 2000. STS-101 was exposed on the pad for 55 days and launched on May 19, 2000, at 10:11 UTC.

### 5.98.1 STS-101 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-101 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.98.2 STS-101 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-101 are shown in table 199. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 199. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 199. STS-101 L-0 surface observations.

Temperature	22.2 °C (72 °F)
Relative humidity	77%
Sea level pressure	1,022.4 hPa (30.19 inHg)
Wind speed	3.4 m/s (6.6 kt) (1-min average)
Wind direction	128° (1-min average)
Sky condition	1/8 cumulus at 762 m (2,500 ft); 1/8 altocumulus at 3,658 m (12,000 ft); 6/8 cirrostratus at 9,144 m (30,000 ft)
Visibility	12.9 km (6.9 nmi) with smoke observed

### 5.98.3 STS-101 Pad Exposure Period Hourly Meteorological Parameters

Figures 589–594 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-101 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 200. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Precipitation is also from MET tower 394. Sea level pressure is from MET tower 398, due to large amounts of missing data from MET tower 394.

Table 200. STS-101 pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	30.6 °C (87 °F)
Minimum relative humidity	34%
Maximum relative humidity	99%
Minimum sea level pressure	1,003.4 hPa (29.63 inHg)
Maximum sea level pressure	1,027.8 hPa (30.35 inHg)
Maximum wind speed and associated wind direction	19.6 m/s (38 kt) 351°
Total precipitation	54.6 mm (2.15 in)

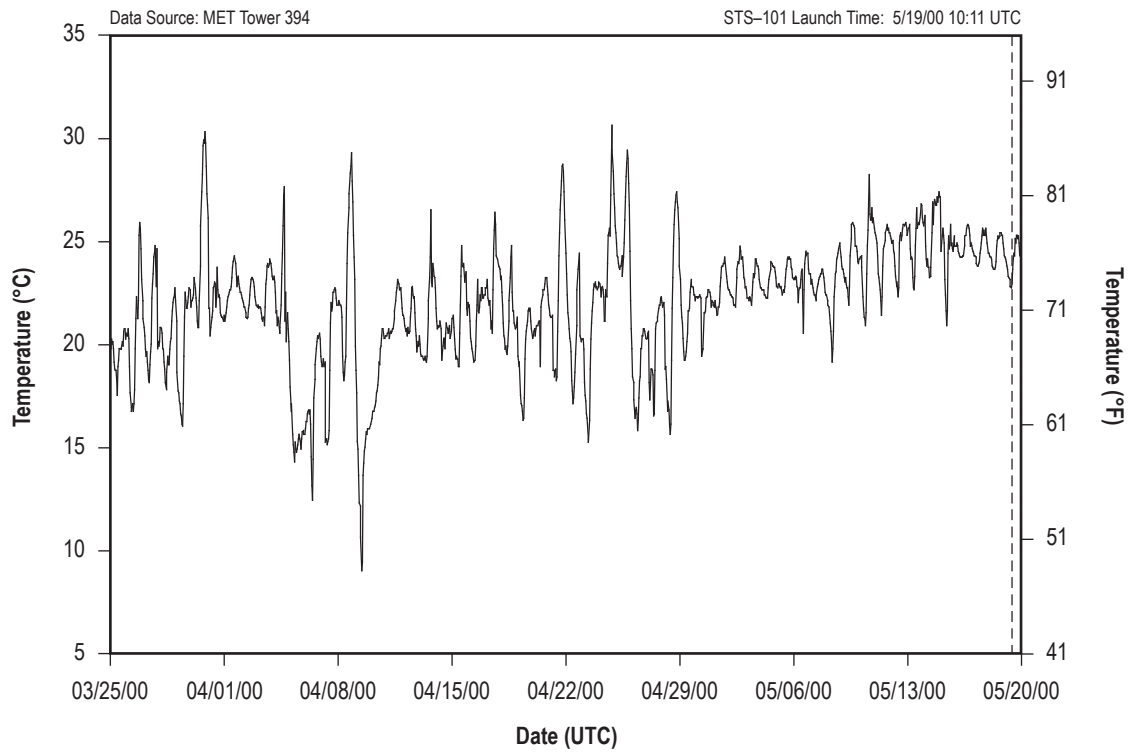


Figure 589. STS-101 hourly surface temperature.

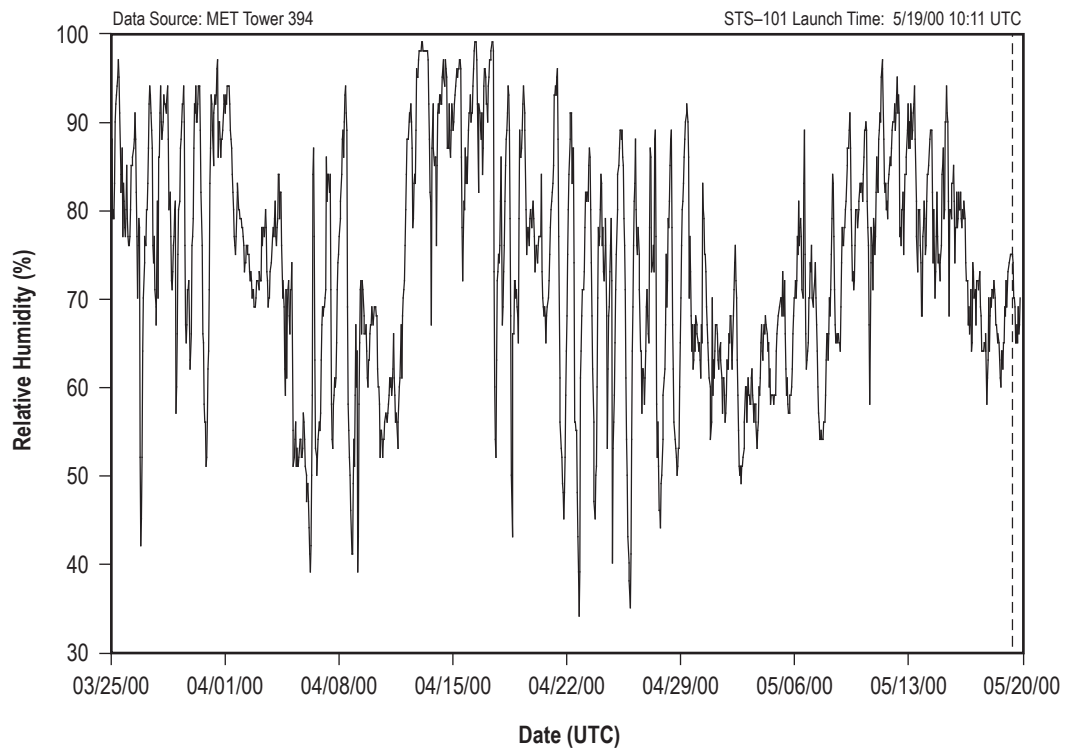


Figure 590. STS-101 hourly surface relative humidity.

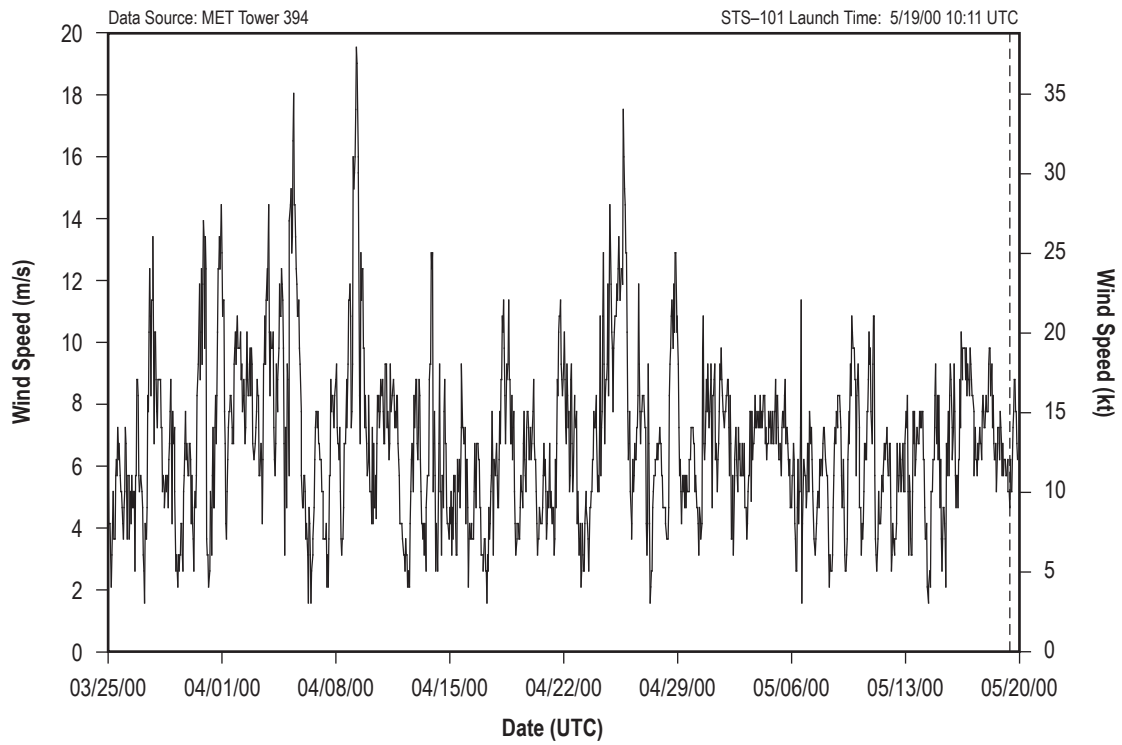


Figure 591. STS-101 hourly surface wind speed.

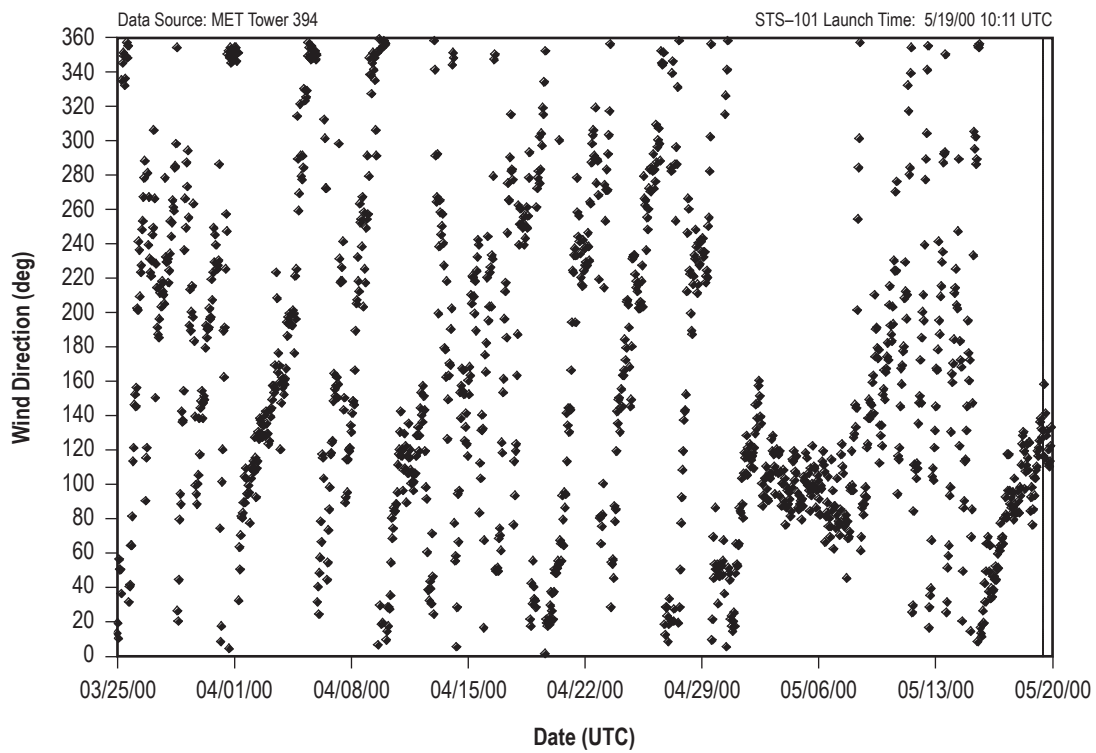


Figure 592. STS-101 hourly surface wind direction.



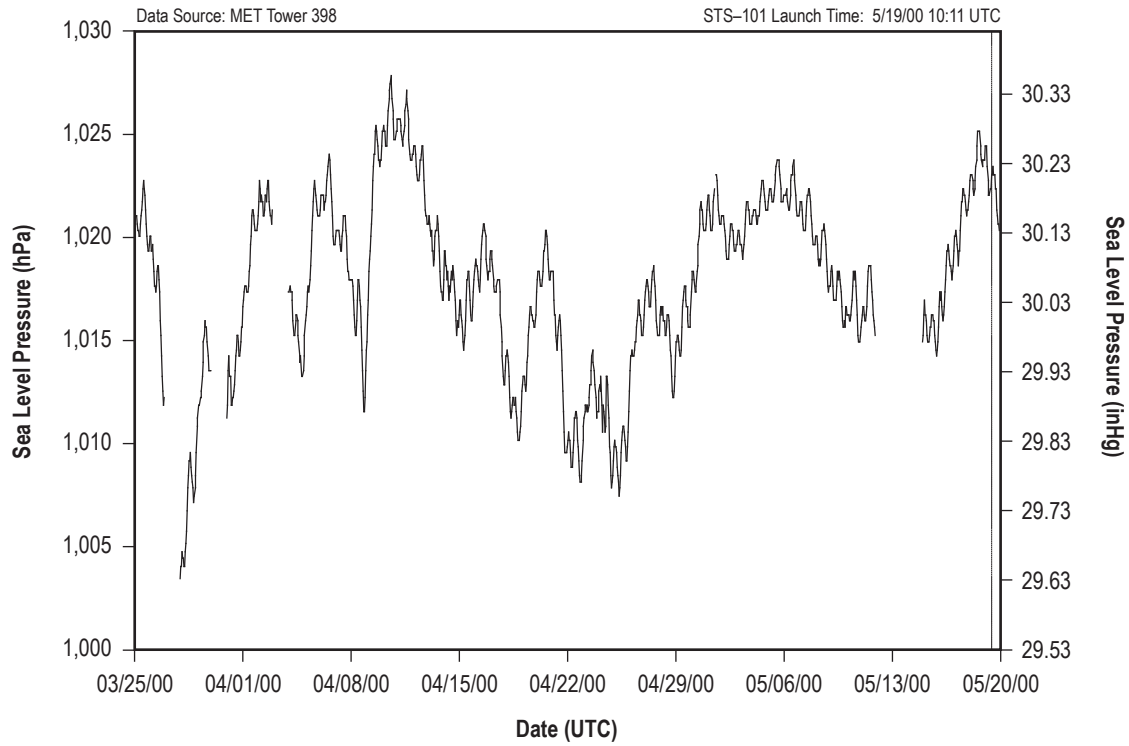


Figure 593. STS-101 hourly sea level pressure.

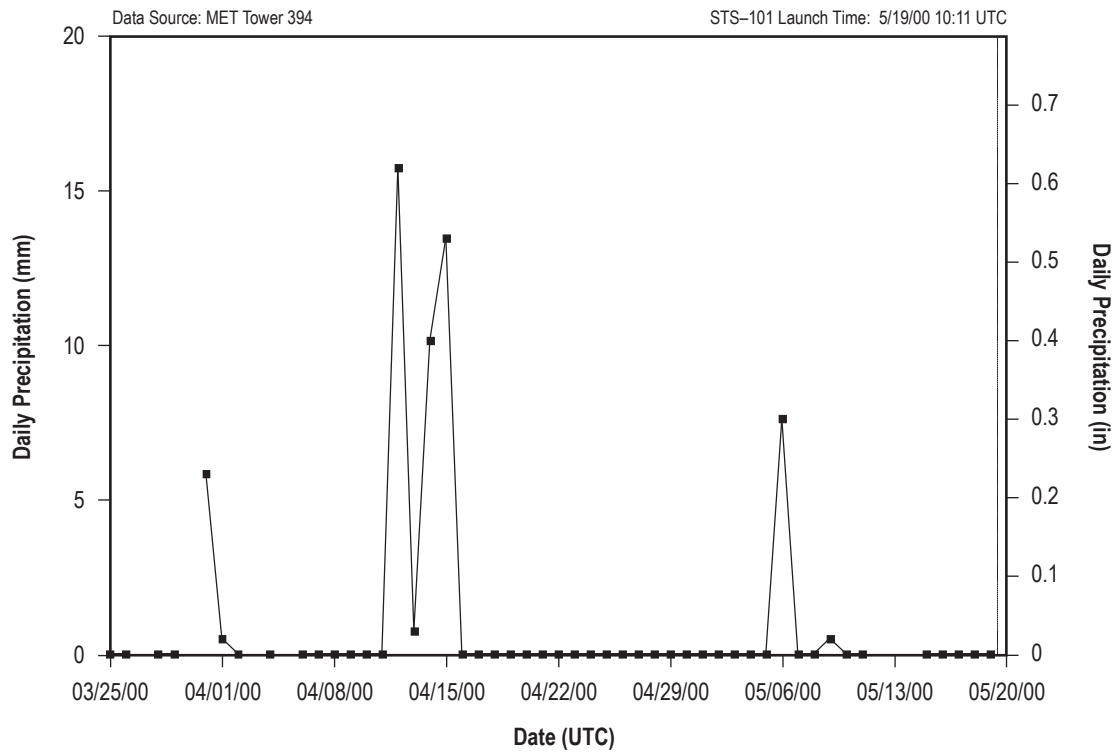


Figure 594. STS-101 daily precipitation totals.

## 5.99 STS–106

STS–106 was the 22d mission for *Atlantis* (OV–104). It rolled out to pad 39B on August 13, 2000. STS–106 was exposed on the pad for 27 days and launched on September 8, 2000, at 12:46 UTC.

### 5.99.1 STS–106 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–106 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.99.2 STS–106 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–106 are shown in table 201. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 201. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 201. STS–106 L–0 surface observations.

Temperature	27.2 °C (81 °F)
Relative humidity	80%
Sea level pressure	1,014.6 hPa (29.96 inHg)
Wind speed	4.1 m/s (8 kt) (1-min average)
Wind direction	8° (1-min average)
Sky condition	1/8 cumulus at 518 m (1,700 ft); 1/8 altocumulus at 4,572 m (15,000 ft); 8/8 cirrostratus at 7,925 m (26,000 ft)
Visibility	16.1 km (8.7 nmi) with smoke observed

### 5.99.3 STS–106 Pad Exposure Period Hourly Meteorological Parameters

Figures 595–600 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–106 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 202. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 398.

Table 202. STS–106 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	32.2 °C (90 °F)
Minimum relative humidity	46%
Maximum relative humidity	100%
Minimum sea level pressure	1,008.4 hPa (29.78 inHg)
Maximum sea level pressure	1,022.7 hPa (30.2 inHg)
Maximum wind speed and associated wind direction	14.9 m/s (29 kt) 211°
Total precipitation	168.1 mm (6.62 in)

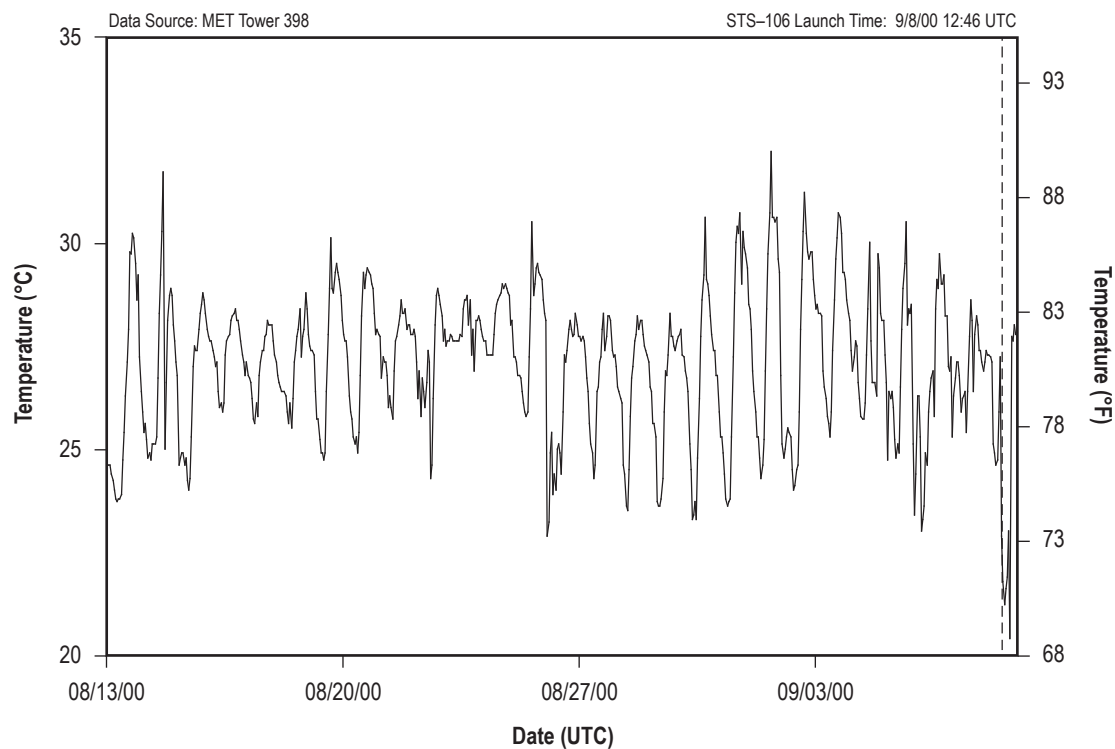


Figure 595. STS-106 hourly surface temperature.

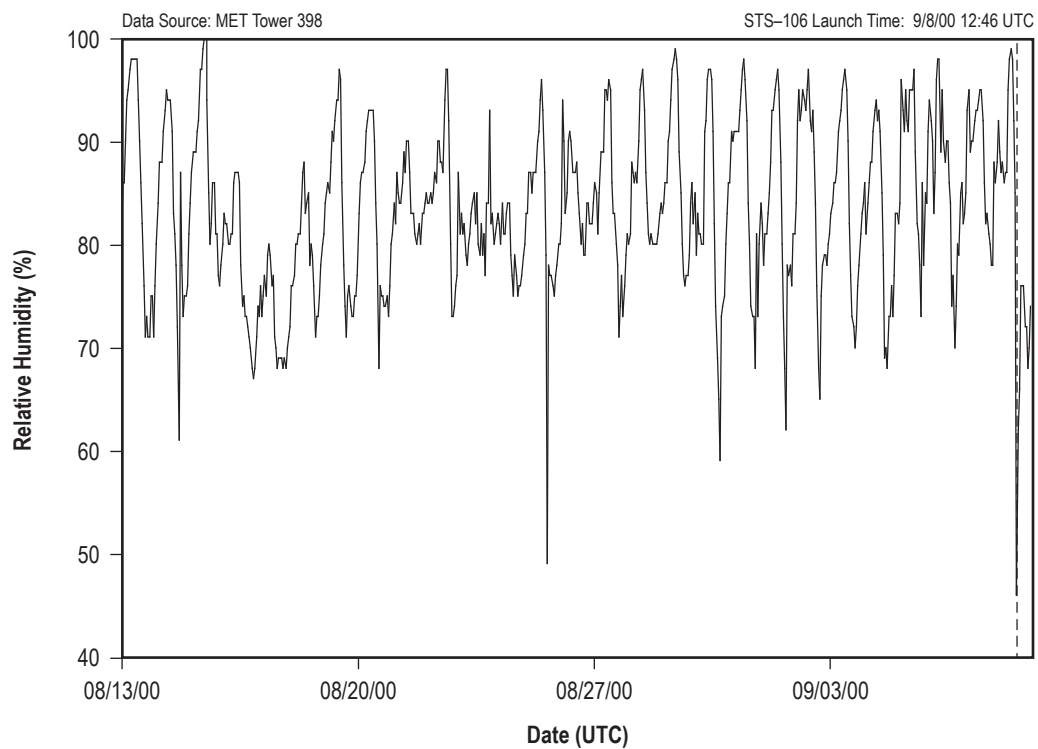


Figure 596. STS-106 hourly surface relative humidity.

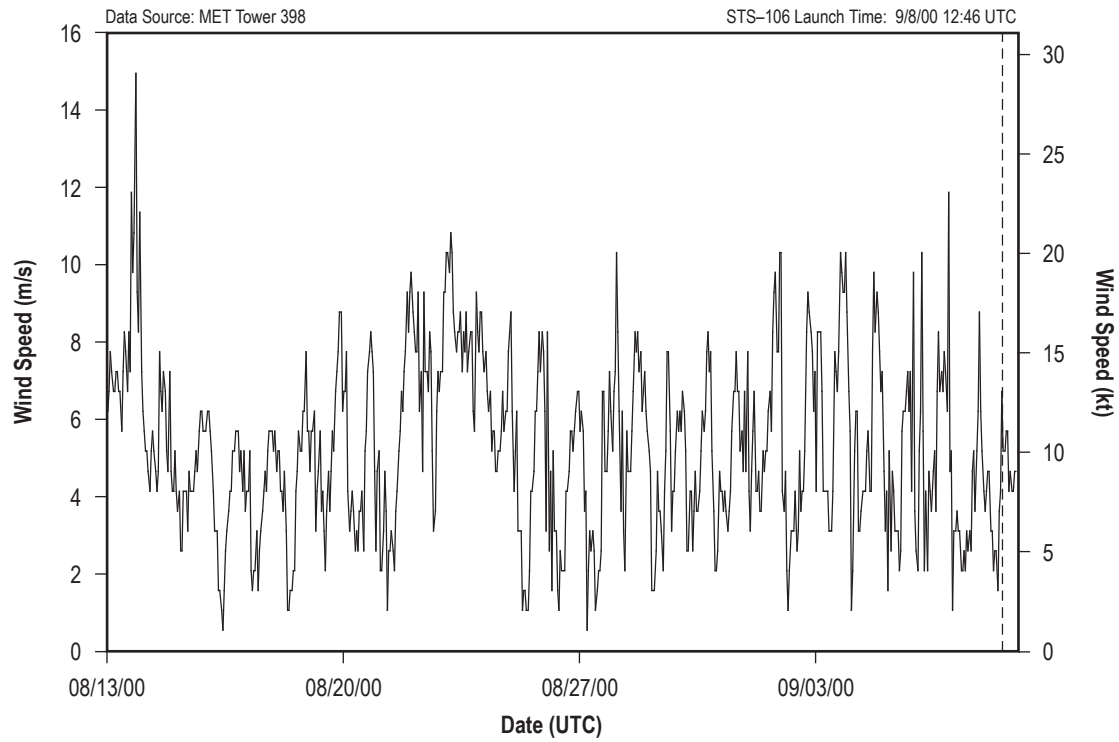


Figure 597. STS-106 hourly surface wind speed.

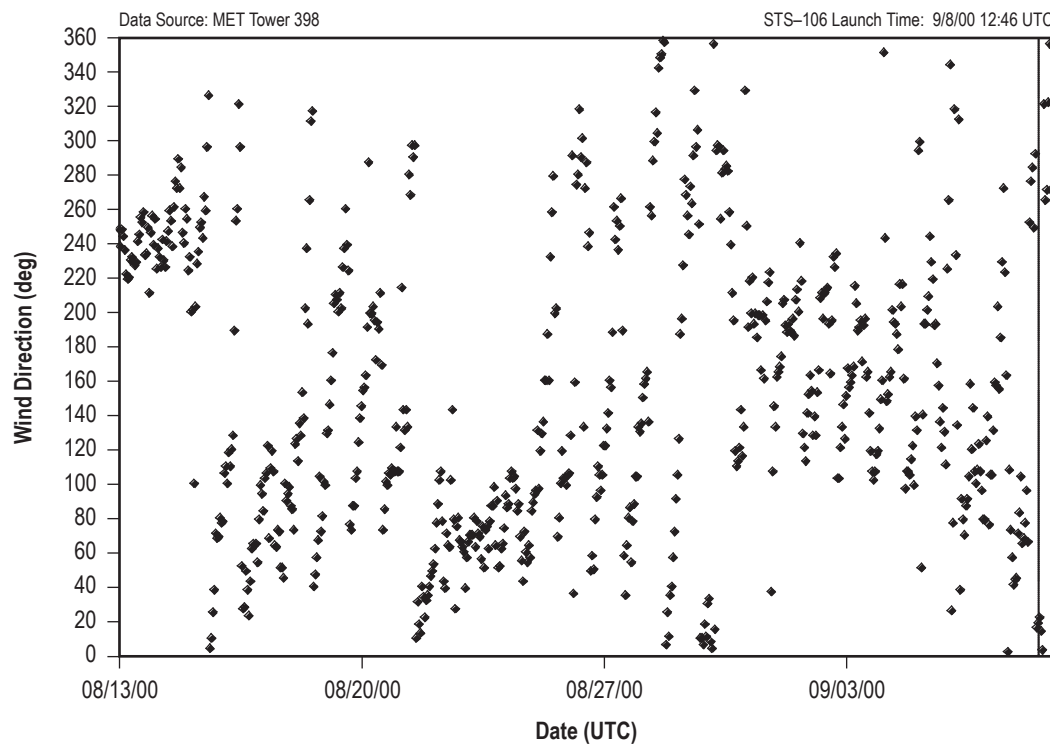


Figure 598. STS-106 hourly surface wind direction.

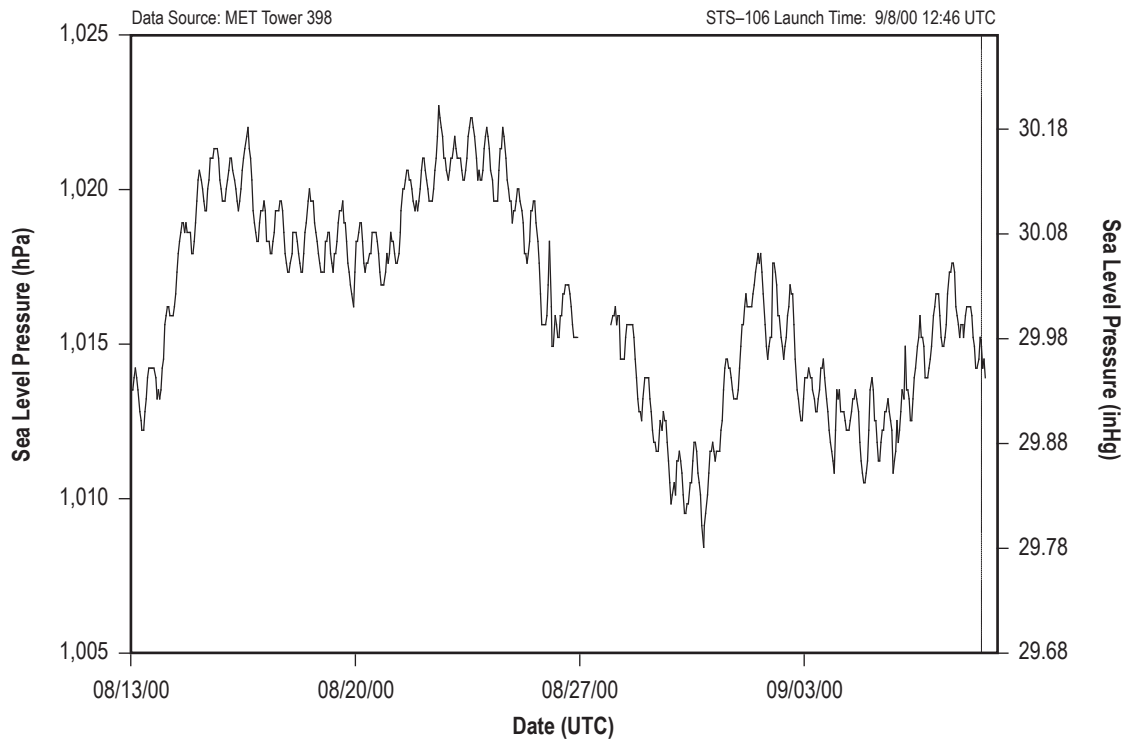


Figure 599. STS-106 hourly sea level pressure.

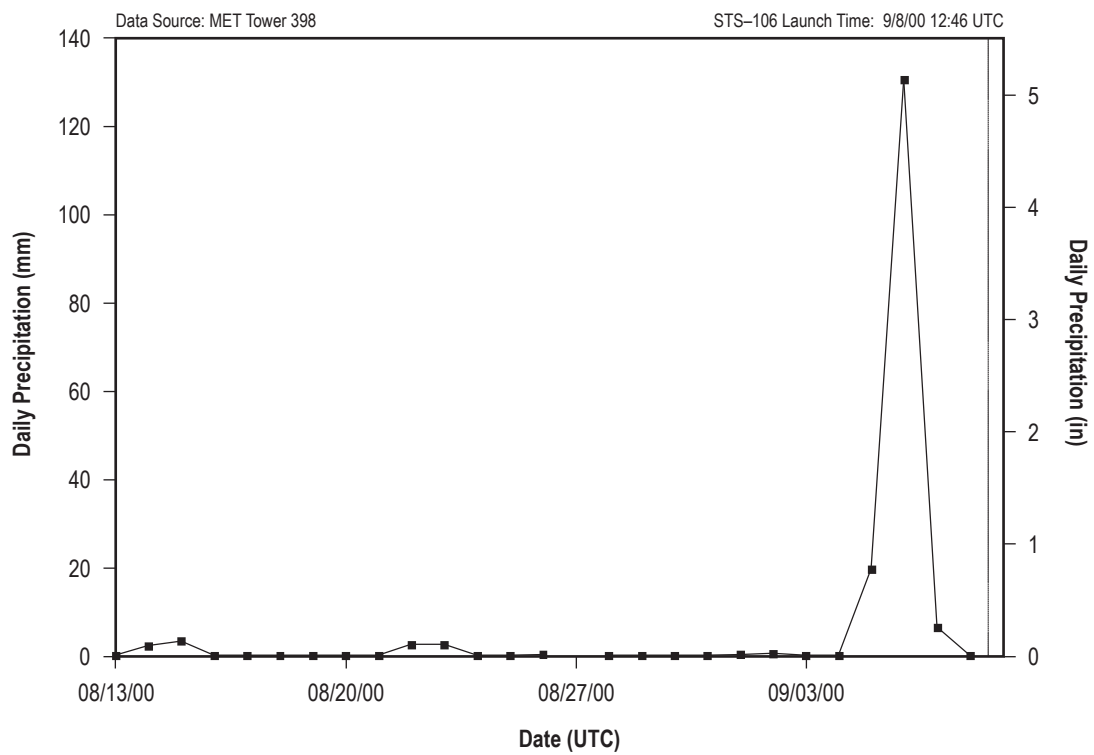


Figure 600. STS-106 daily precipitation totals.

## 5.100 STS–92

STS–92 was the 28th mission for *Discovery* (OV–103). It rolled out to pad 39A on September 11, 2000. STS–92 was exposed on the pad for 31 days and launched on October 11, 2000, at 23:17 UTC.

### 5.100.1 STS–92 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–92 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.100.2 STS–92 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–92 are shown in table 203. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 203. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 203. STS–92 L–0 surface observations.

Temperature	22.8 °C (73 °F)
Relative humidity	67%
Sea level pressure	1,020.6 hPa (30.14 inHg)
Wind speed	6.8 m/s (13.2 kt) (1-min average)
Wind direction	50° (1-min average)
Sky condition	3/8 cumulus at 1,067 m (3,500 ft); 1/8 stratocumulus at 1,372 m (4,500 ft); 1/8 altocumulus at 2,286 m (7,500 ft)
Visibility	16.1 km (8.7 nmi)

### 5.100.3 STS–92 Pad Exposure Period Hourly Meteorological Parameters

Figures 601–606 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–92 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 204. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 204. STS–92 pad exposure period hourly extremes.

Minimum temperature	17.8 °C (64 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	57%
Maximum relative humidity	99%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,023.7 hPa (30.23 inHg)
Maximum wind speed and associated wind direction	21.1 m/s (41 kt) 45°
Total precipitation	185.9 mm (7.32 in)

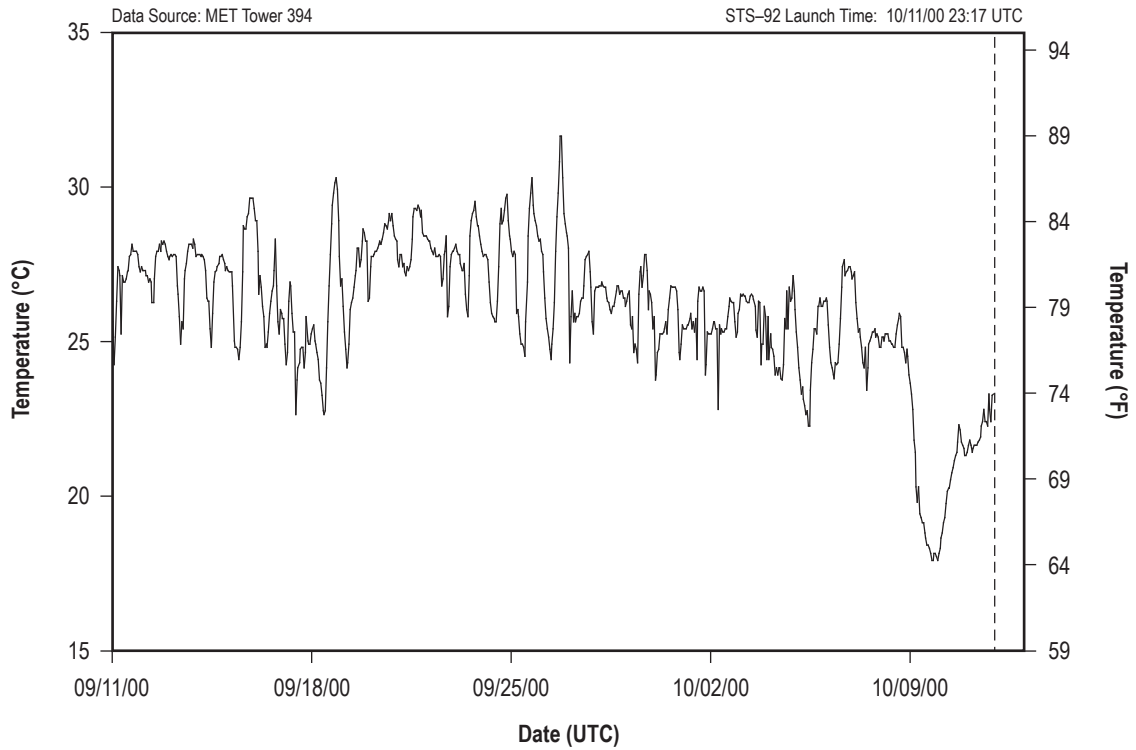


Figure 601. STS-92 hourly surface temperature.

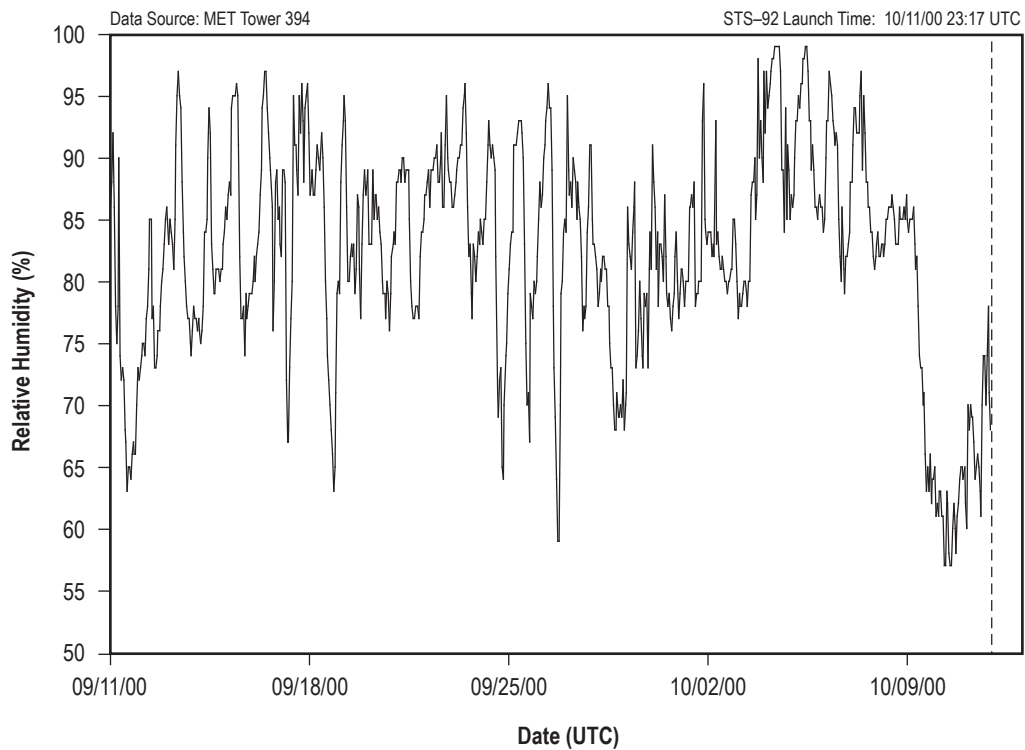


Figure 602. STS-92 hourly surface relative humidity.

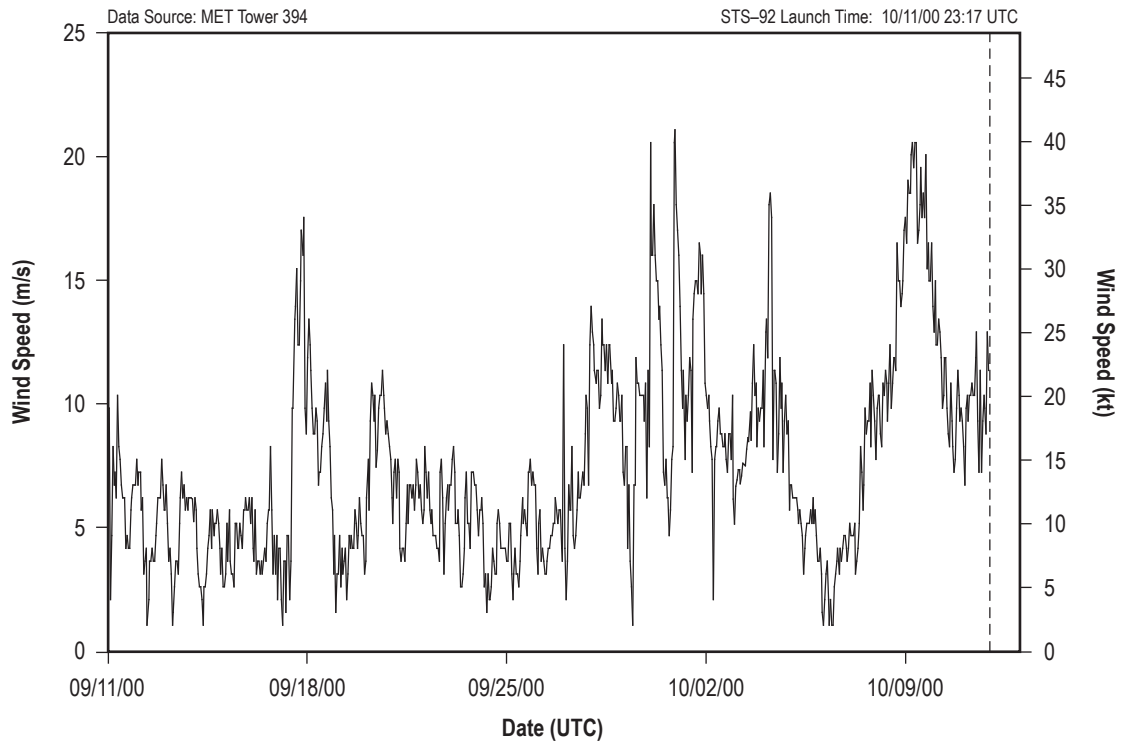


Figure 603. STS-92 hourly surface wind speed.

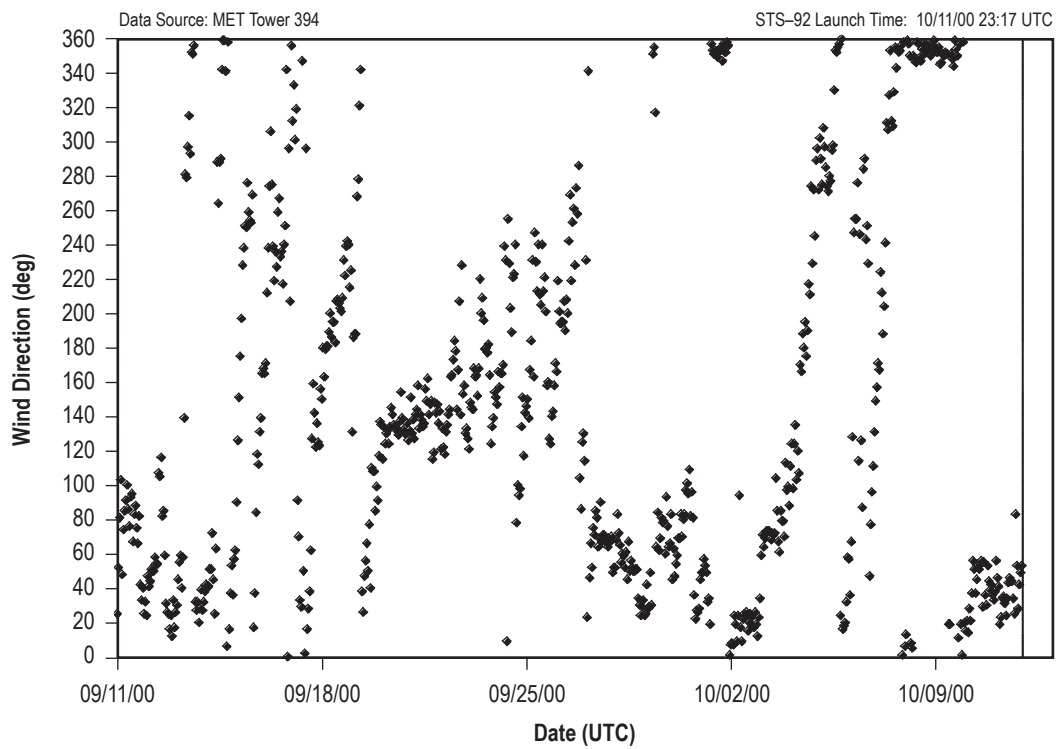


Figure 604. STS-92 hourly surface wind direction.



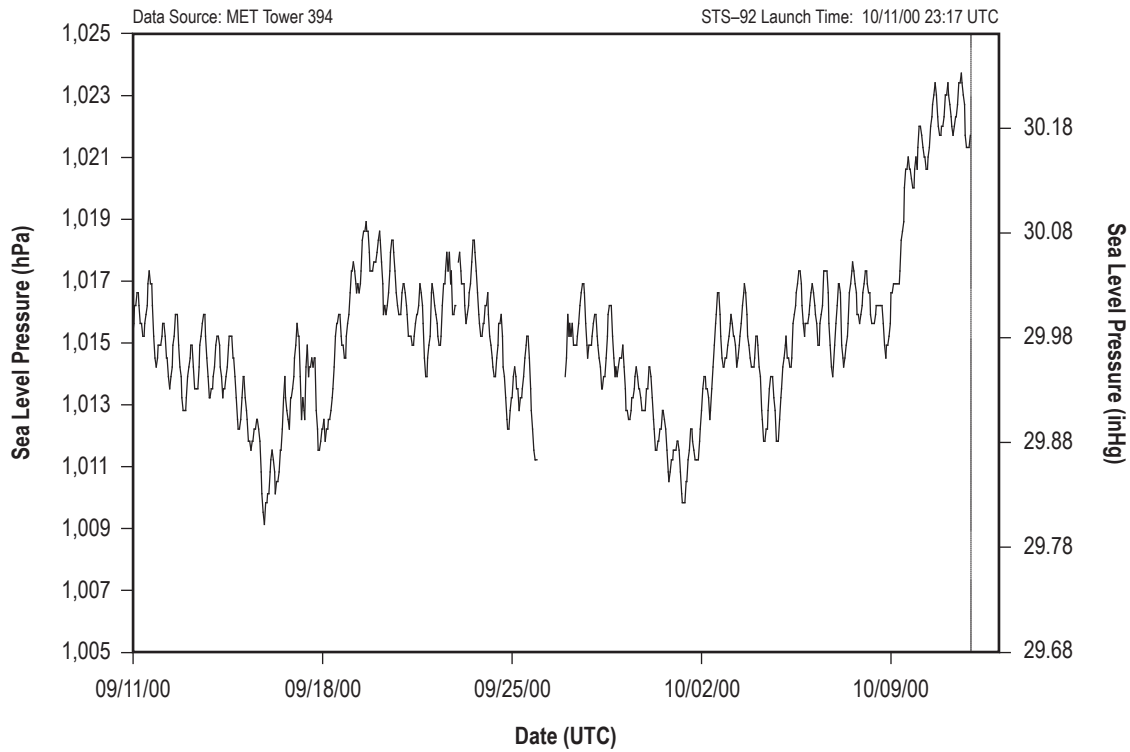


Figure 605. STS-92 hourly sea level pressure.

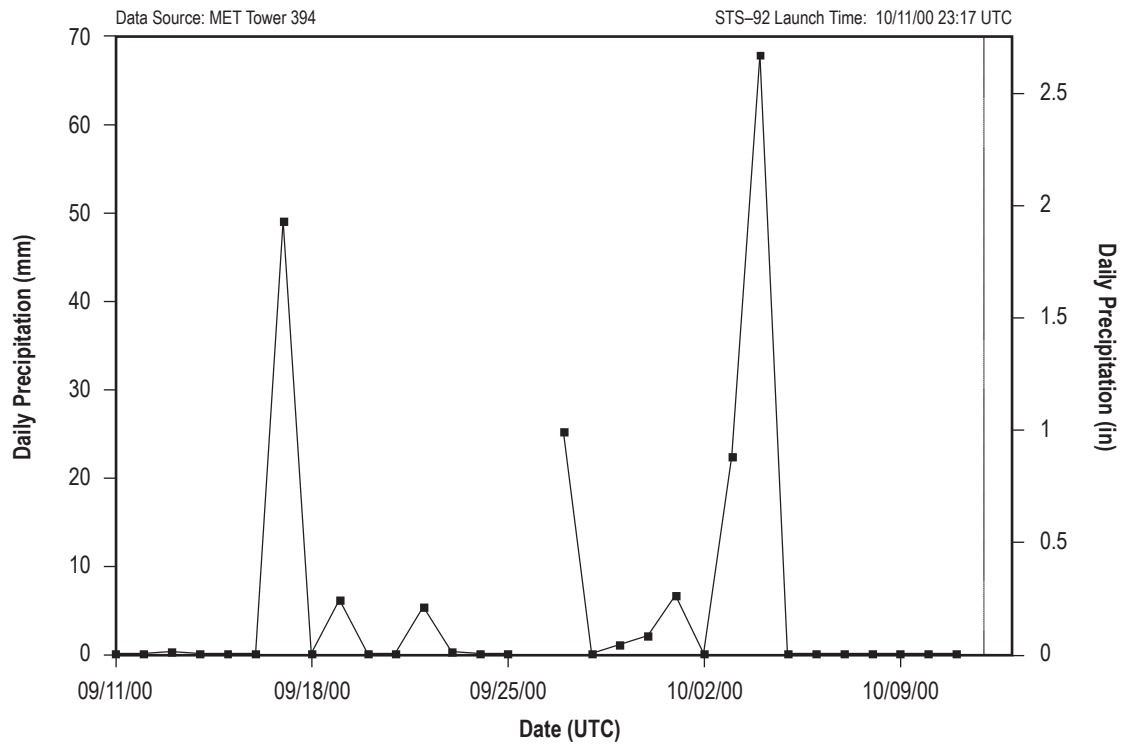


Figure 606. STS-92 daily precipitation totals.

## 5.101 STS-97

STS-97 was the 15th mission for *Endeavour* (OV-105). It rolled out to pad 39B on October 31, 2000. STS-97 was exposed on the pad for 31 days and launched on December 1, 2000, at 03:06 UTC.

### 5.101.1 STS-97 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-97 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.101.2 STS-97 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-97 are shown in table 205. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 205. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 205. STS-97 L-0 surface observations.

Temperature	17.2 °C (63 °F)
Relative humidity	65%
Sea level pressure	1,022.4 hPa (30.19 inHg)
Wind speed	3.9 m/s (7.6 kt) (1-min average)
Wind direction	7° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi) with smoke observed

### 5.101.3 STS-97 Pad Exposure Period Hourly Meteorological Parameters

Figures 607–612 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-97 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 206. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 398.

Table 206. STS-97 pad exposure period hourly extremes.

Minimum temperature	5 °C (41 °F)
Maximum temperature	27.8 °C (82 °F)
Minimum relative humidity	39%
Maximum relative humidity	100%
Minimum sea level pressure	1,011.5 hPa (29.87 inHg)
Maximum sea level pressure	1,031.2 hPa (30.45 inHg)
Maximum wind speed and associated wind direction	17 m/s (33 kt) 355°
Total precipitation	23.9 mm (0.94 in)

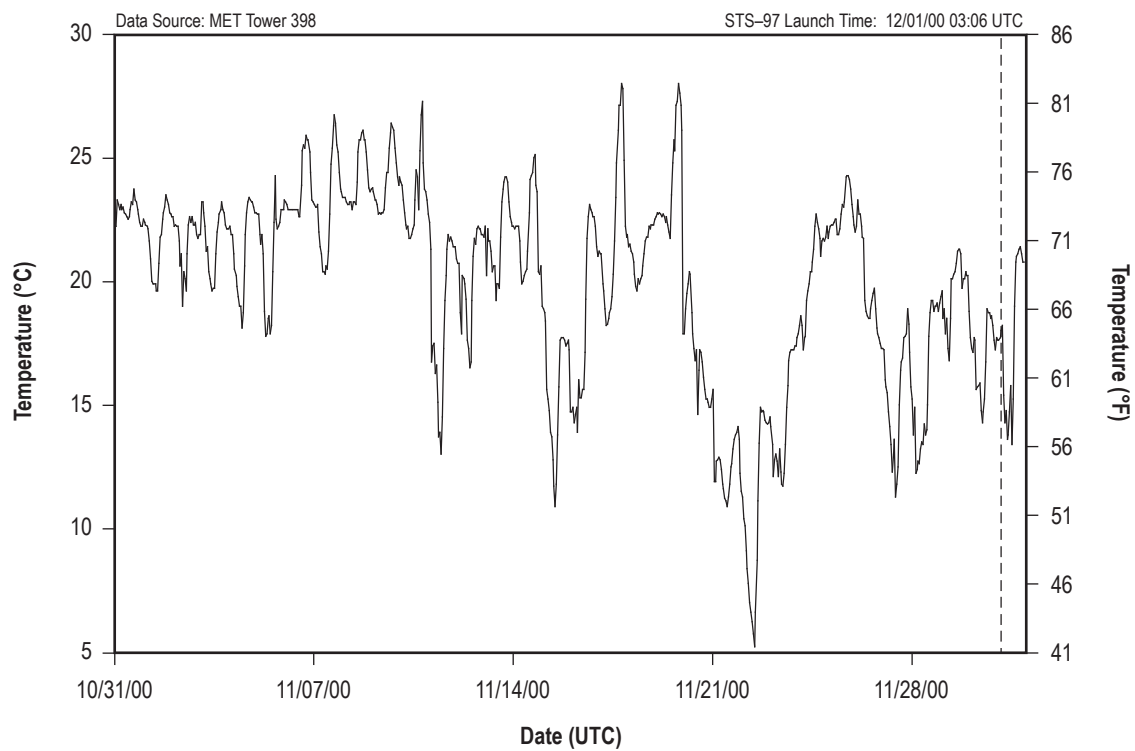


Figure 607. STS-97 hourly surface temperature.

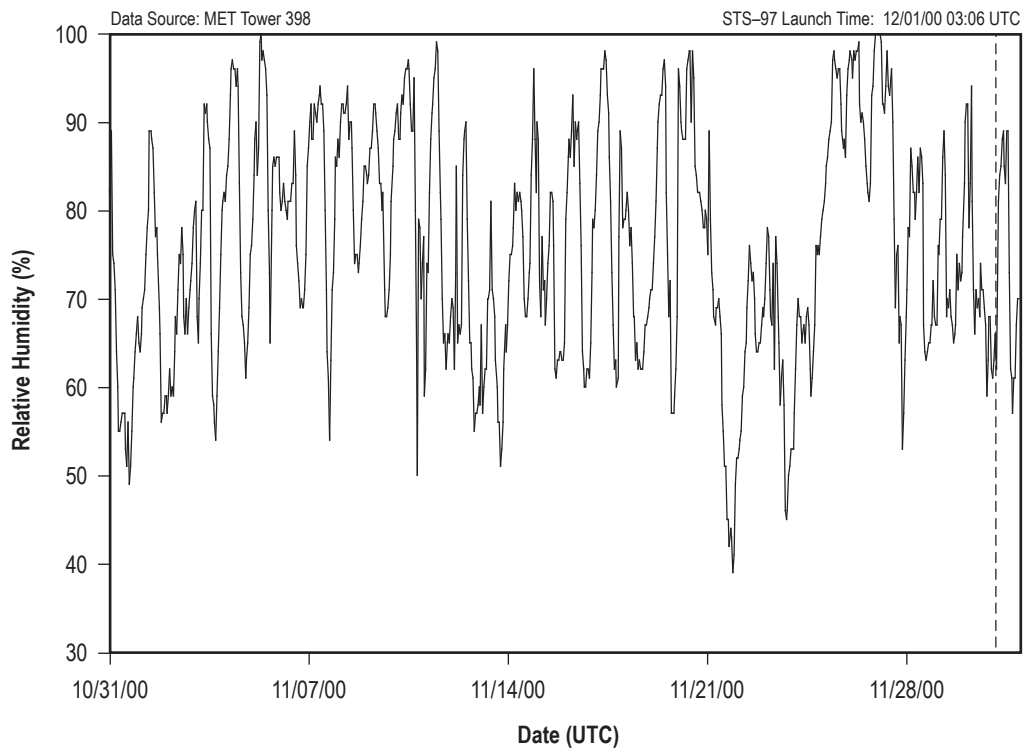


Figure 608. STS-97 hourly surface relative humidity.

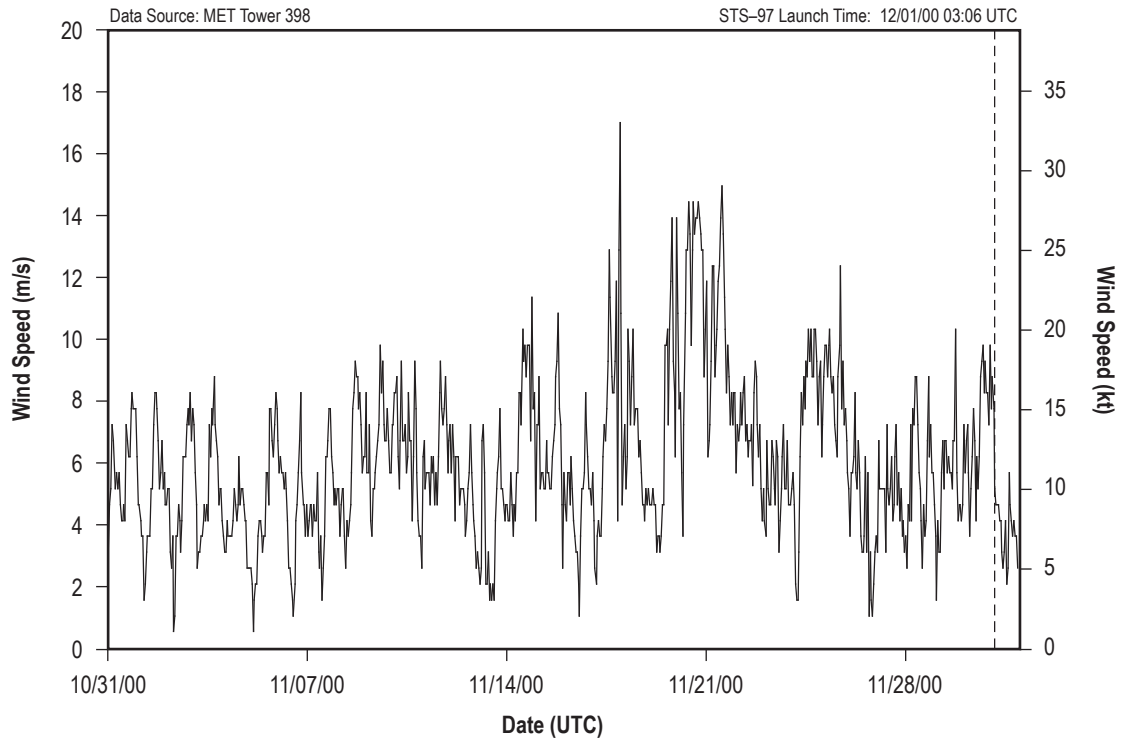


Figure 609. STS-97 hourly surface wind speed.

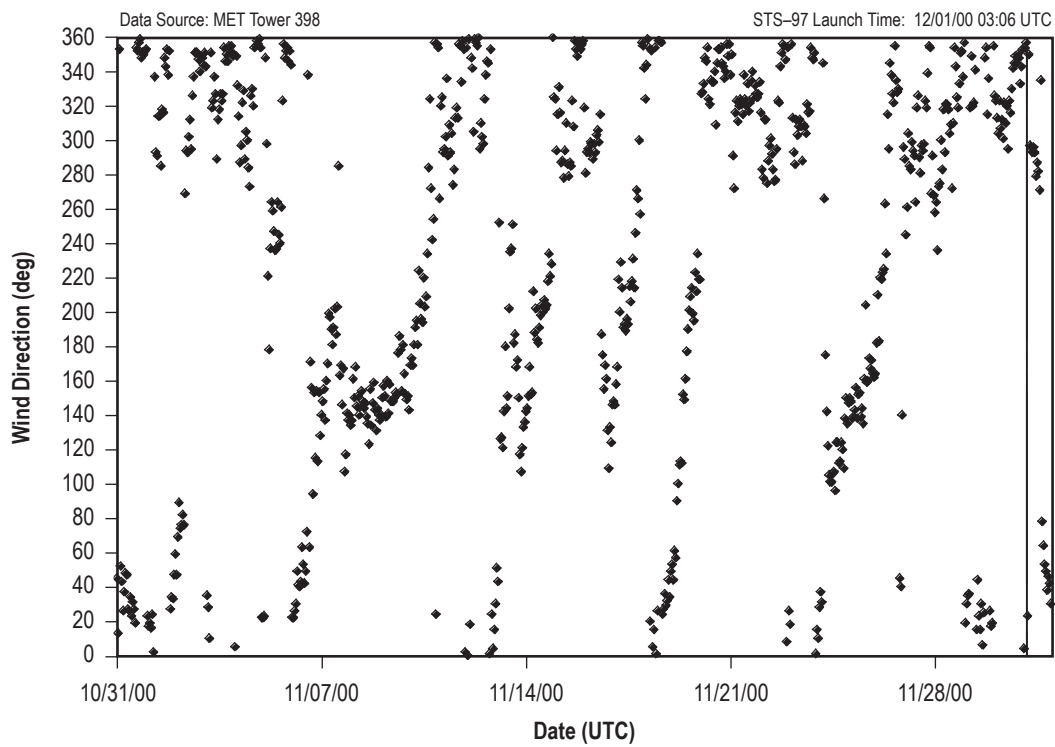


Figure 610. STS-97 hourly surface wind direction.

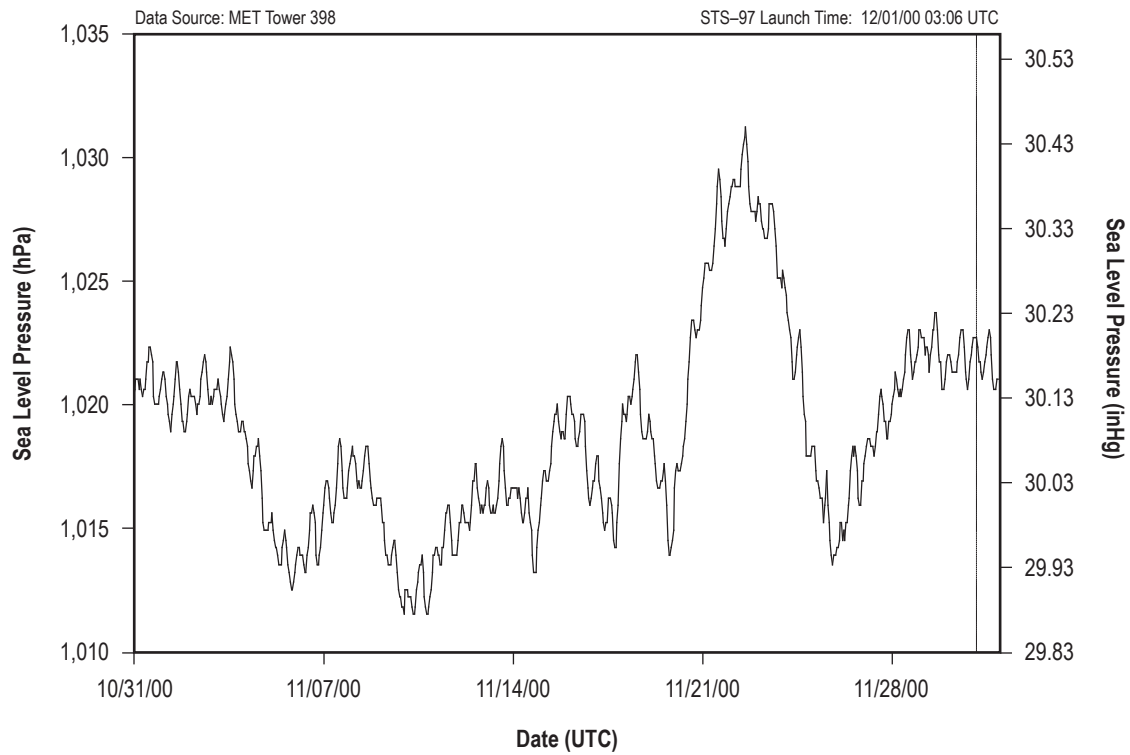


Figure 611. STS-97 hourly sea level pressure.

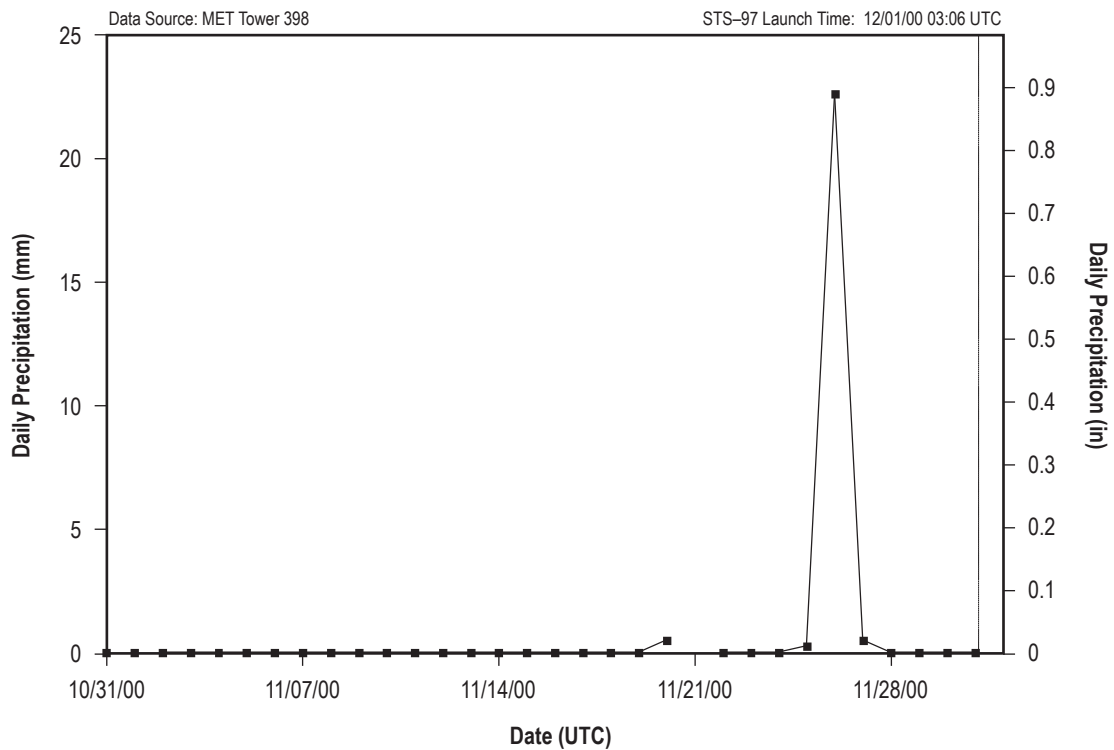


Figure 612. STS-97 daily precipitation totals.

## 5.102 STS-98

STS-98 was the 23d mission for *Atlantis* (OV-104). It rolled out to pad 39A the first time on January 3, 2001. It was rolled back from the pad on January 19, 2001. STS-98 rolled out to pad 39A the second time on January 26, 2001. STS-98 was exposed on the pad for a total of 30 days (17 days after the first rollout and 13 days after the second rollout) and launched on February 7, 2001, at 23:13 UTC.

### 5.102.1 STS-98 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS-98 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.102.2 STS-98 L-0 Surface Observations

The surface meteorological parameters observed at L-0 for STS-98 are shown in table 207. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 207. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 207. STS-98 L-0 surface observations.

Temperature	18.3 °C (65 °F)
Relative humidity	83%
Sea level pressure	1,024.7 hPa (30.26 inHg)
Wind speed	2.7 m/s (5.3 kt) (1-min average)
Wind direction	59° (1-min average)
Sky condition	1/8 stratocumulus at 1,219 m (4,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.102.3 STS-98 Pad Exposure Period Hourly Meteorological Parameters

Figures 613–618 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS-98 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 208. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 208. STS-98 pad exposure period hourly extremes.

Minimum temperature	1.7 °C (35 °F)
Maximum temperature	26.7 °C (80 °F)
Minimum relative humidity	26%
Maximum relative humidity	100%
Minimum sea level pressure	1,012.5 hPa (29.9 inHg)
Maximum sea level pressure	1,030.1 hPa (30.42 inHg)
Maximum wind speed and associated wind direction	15.4 m/s (30 kt) 358°
Total precipitation	7.1 mm (0.28 in)

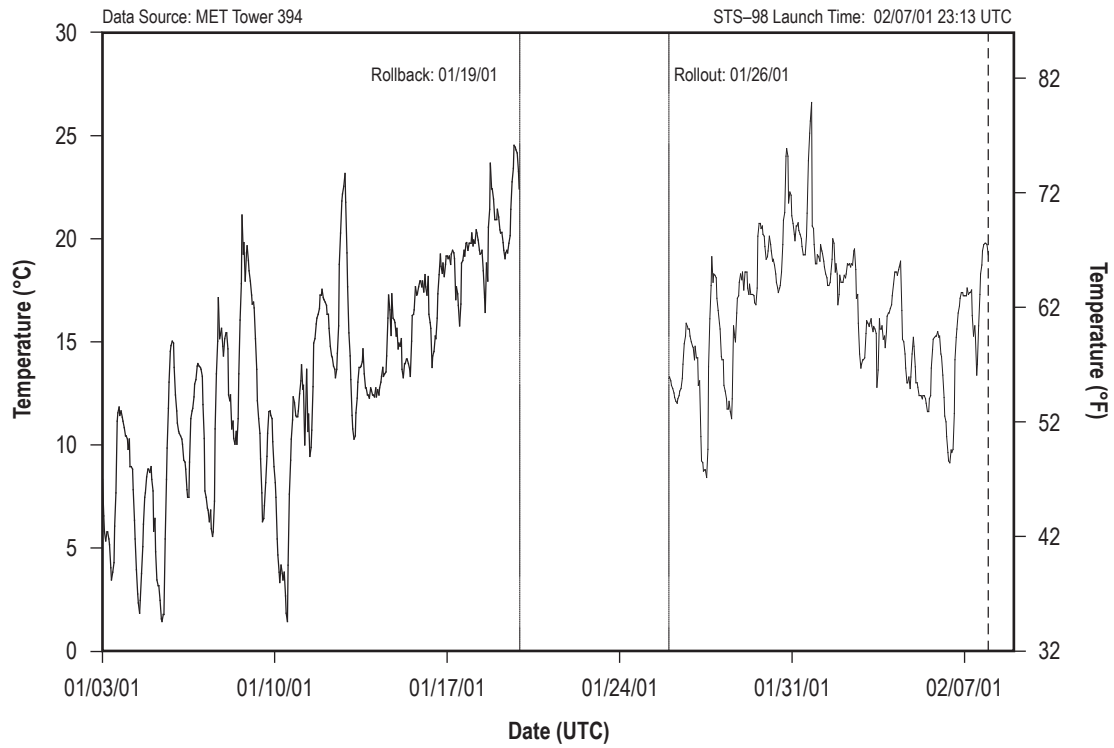


Figure 613. STS-98 hourly surface temperature.

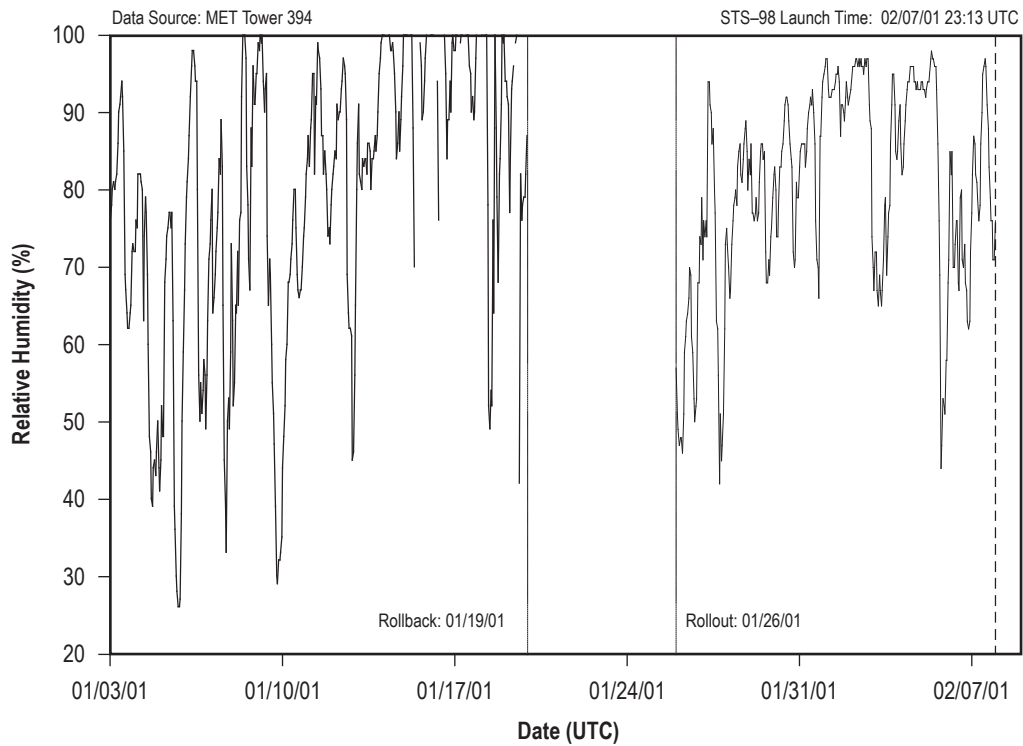


Figure 614. STS-98 hourly surface relative humidity.

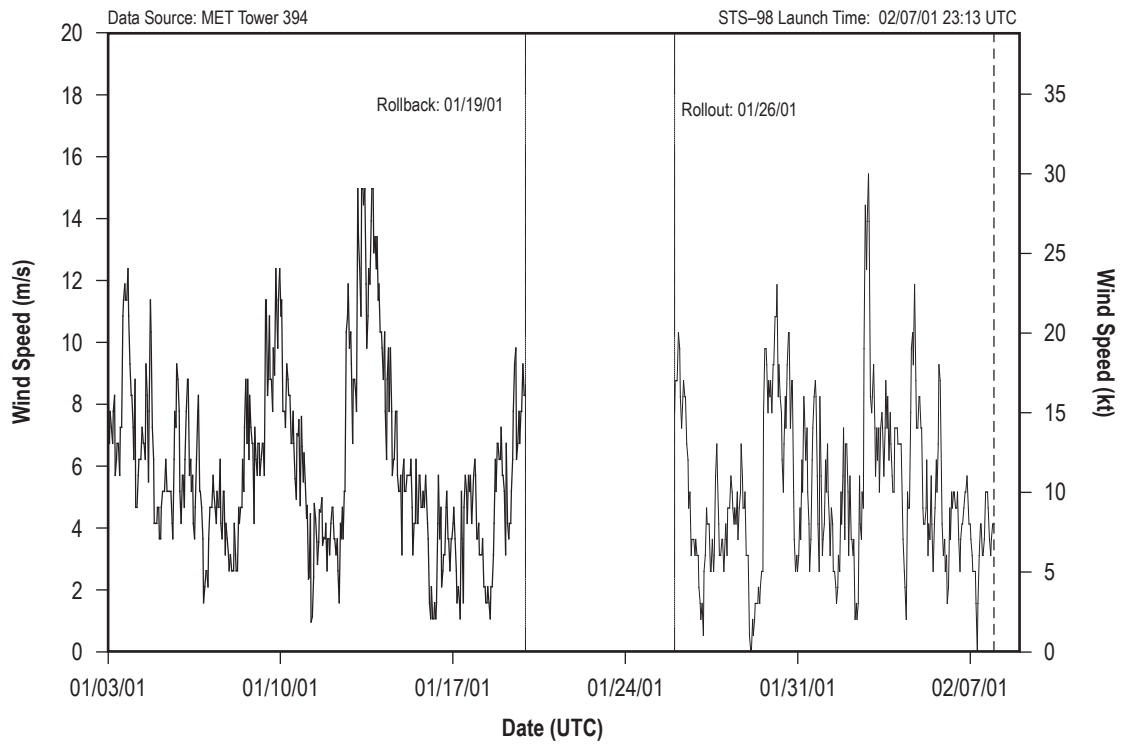


Figure 615. STS-98 hourly surface wind speed.

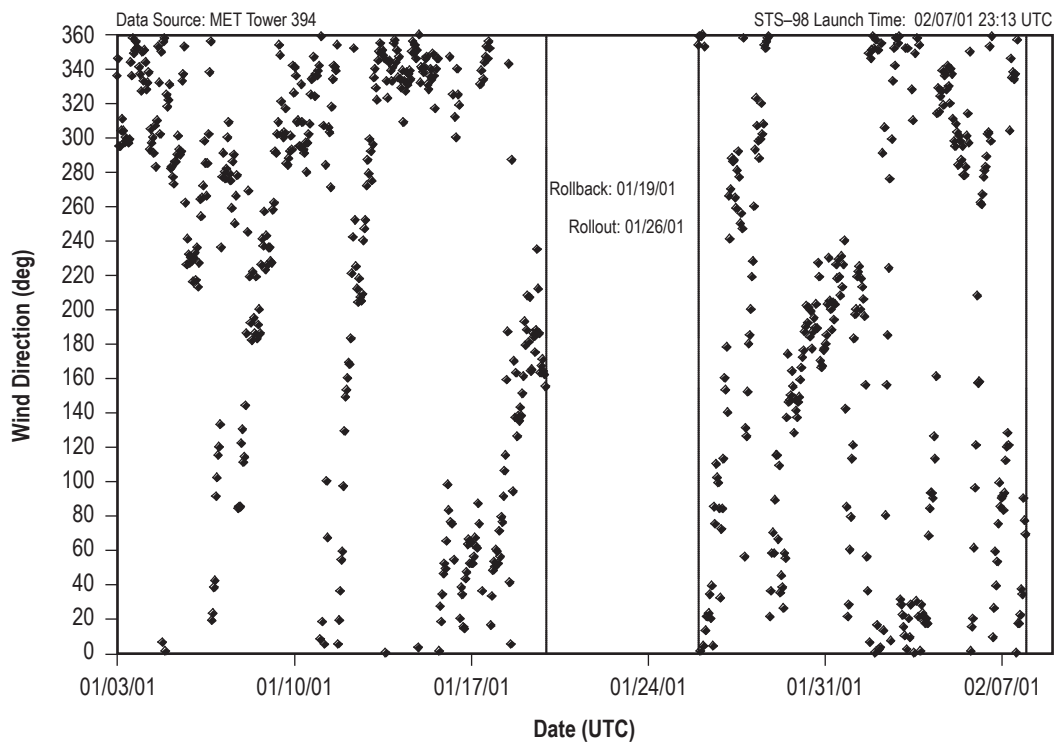


Figure 616. STS-98 hourly surface wind direction.



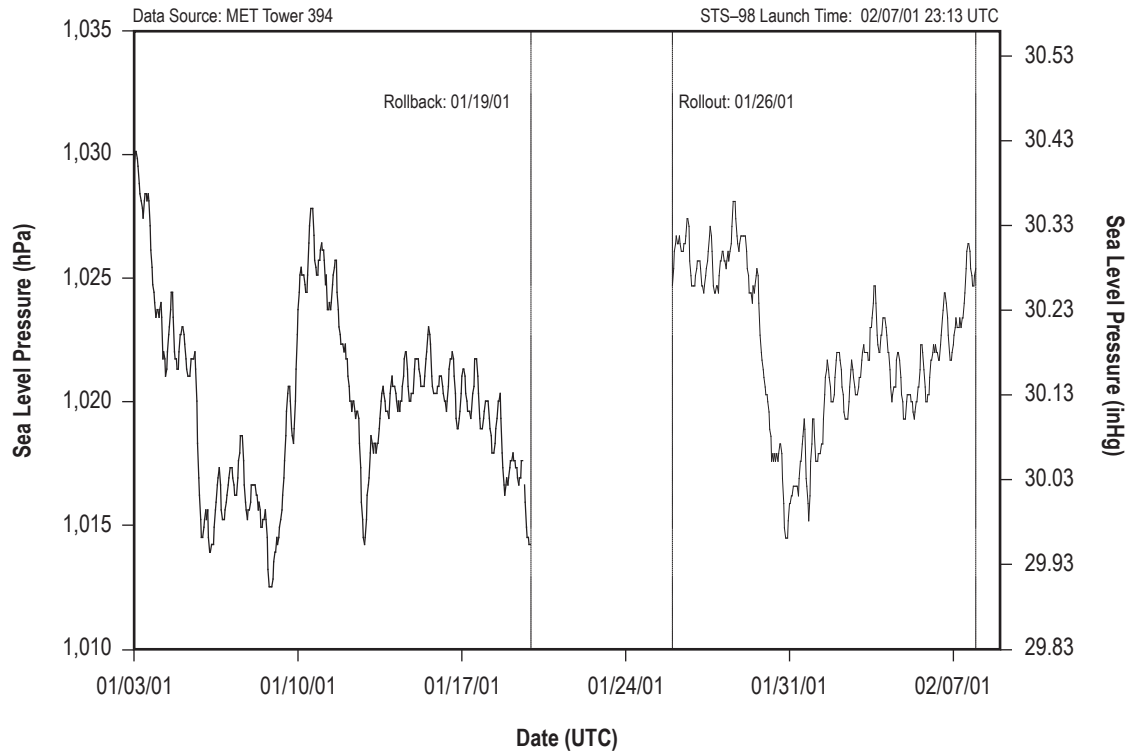


Figure 617. STS-98 hourly sea level pressure.

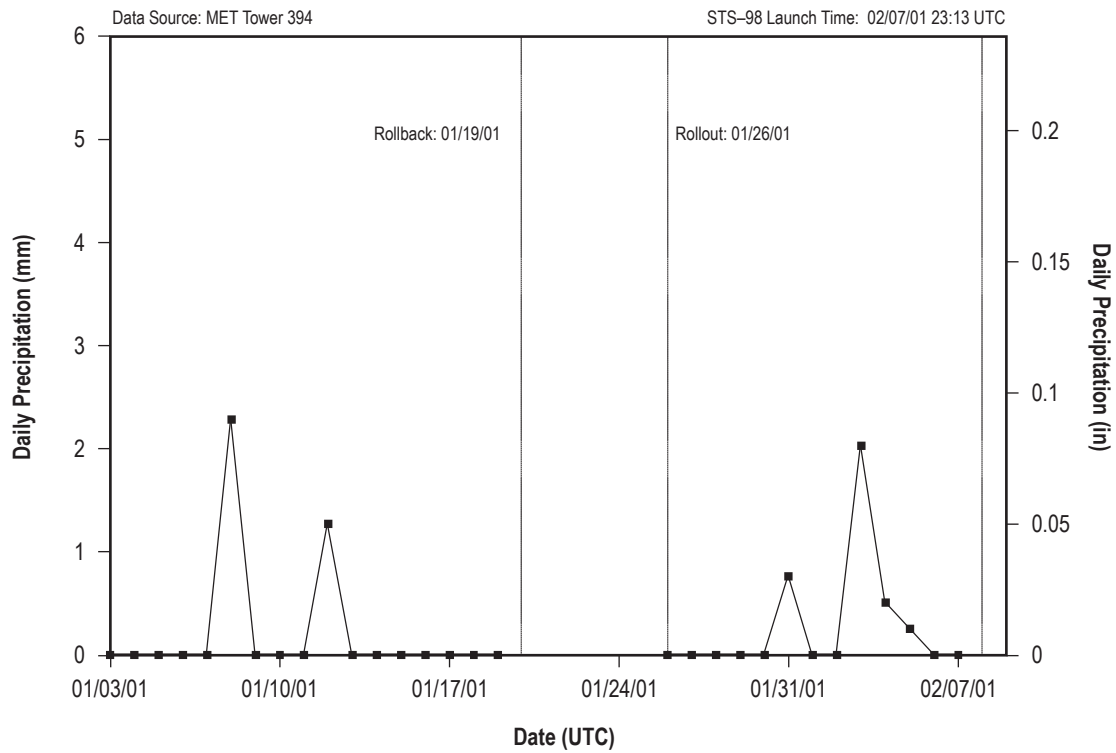


Figure 618. STS-98 daily precipitation totals.

### 5.103 STS–102

STS–102 was the 29th mission for *Discovery* (OV–103). It rolled out to pad 39B on February 12, 2001. STS–102 was exposed on the pad for 24 days and launched on March 8, 2001, at 11:42 UTC.

#### 5.103.1 STS–102 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–102 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

#### 5.103.2 STS–102 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–102 are shown in table 209. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 209. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 209. STS–102 L–0 surface observations.

Temperature	5.6 °C (42 °F)
Relative humidity	71%
Sea level pressure	1,018.6 hPa (30.08 inHg)
Wind speed	3.6 m/s (6.9 kt) (1-min average)
Wind direction	289° (1-min average)
Sky condition	Clear skies
Visibility	16.1 km (8.7 nmi)

#### 5.103.3 STS–102 Pad Exposure Period Hourly Meteorological Parameters

Figures 619–624 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–102 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 210. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 398.

Table 210. STS–102 pad exposure period hourly extremes.

Minimum temperature	5.6 °C (42 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	16%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,029.1 hPa (30.39 inHg)
Maximum wind speed and associated wind direction	16.5 m/s (32 kt) 283°
Total precipitation	8.9 mm (0.35 in)

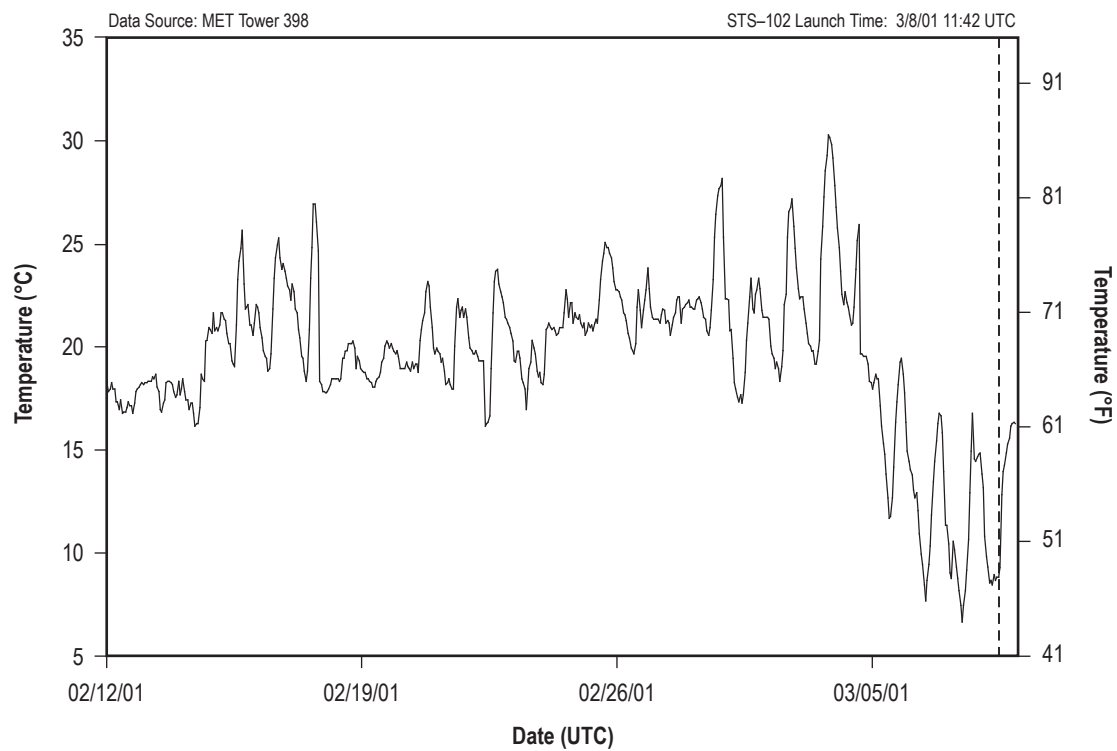


Figure 619. STS-102 hourly surface temperature.

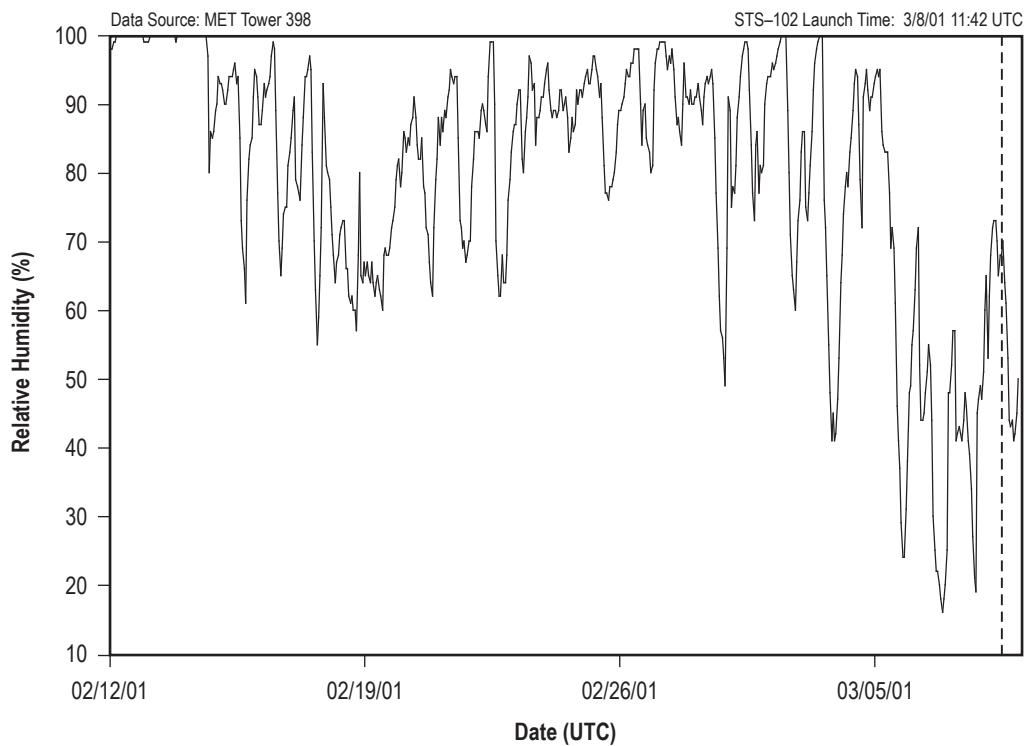


Figure 620. STS-102 hourly surface relative humidity.

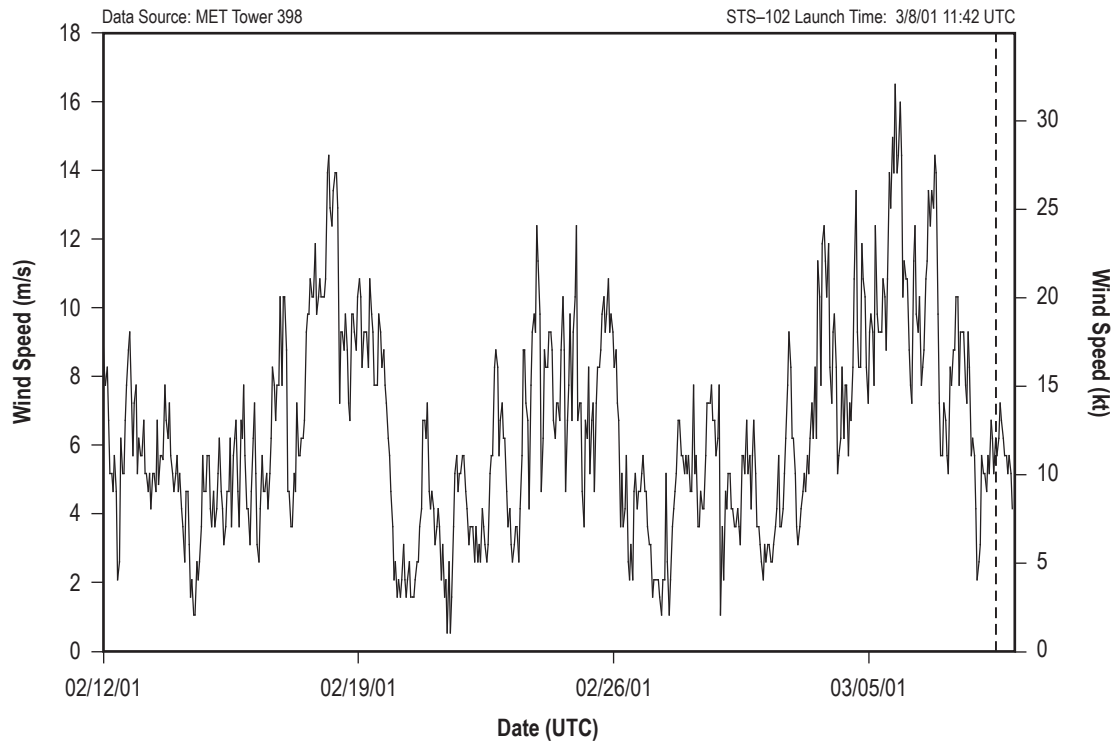


Figure 621. STS-102 hourly surface wind speed.

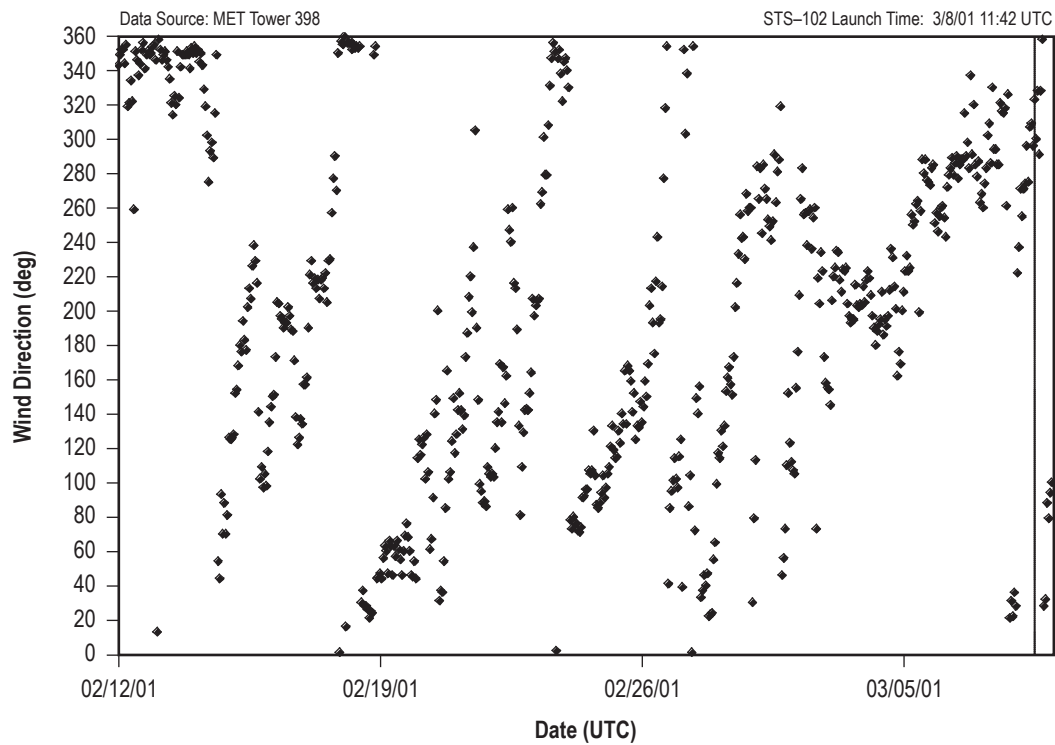


Figure 622. STS-102 hourly surface wind direction.

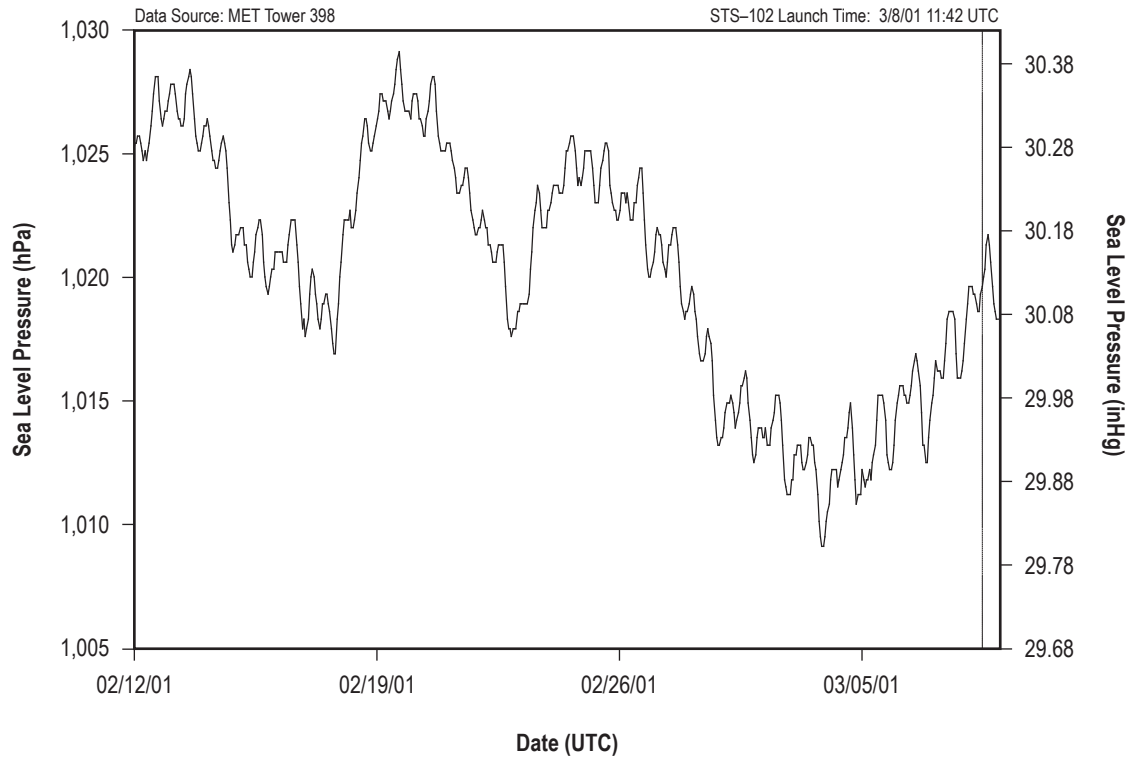


Figure 623. STS-102 hourly sea level pressure.

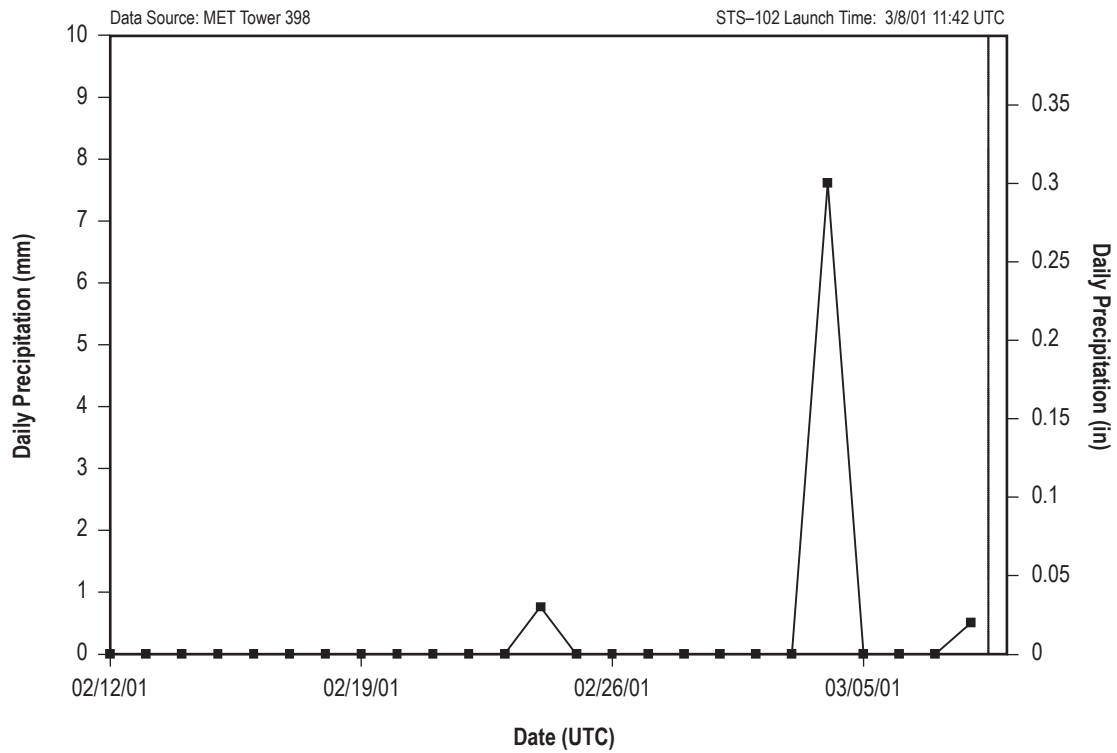


Figure 624. STS-102 daily precipitation totals.

## 5.104 STS–100

STS–100 was the 16th mission for *Endeavour* (OV–105). It rolled out to pad 39A on March 22, 2001. STS–100 was exposed on the pad for 29 days and launched on April 19, 2001, at 18:41 UTC.

### 5.104.1 STS–100 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–100 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.104.2 STS–100 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–100 are shown in table 211. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 211. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 211. STS–100 L–0 surface observations.

Temperature	20.6 °C (69 °F)
Relative humidity	38%
Sea level pressure	1,026.1 hPa (30.3 inHg)
Wind speed	3.3 m/s (6.5 kt) (1-min average)
Wind direction	7.6° (1-min average)
Sky condition	1/8 stratocumulus at 1,219 m (4,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.104.3 STS–100 Pad Exposure Period Hourly Meteorological Parameters

Figures 625–630 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–100 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 212. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 212. STS–100 pad exposure period hourly extremes.

Minimum temperature	8.9 °C (48 °F)
Maximum temperature	28.9 °C (84 °F)
Minimum relative humidity	29%
Maximum relative humidity	98%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,027.8 hPa (30.35 inHg)
Maximum wind speed and associated wind direction	18.5 m/s (36 kt) 2°
Total precipitation	46 mm (1.81 in)

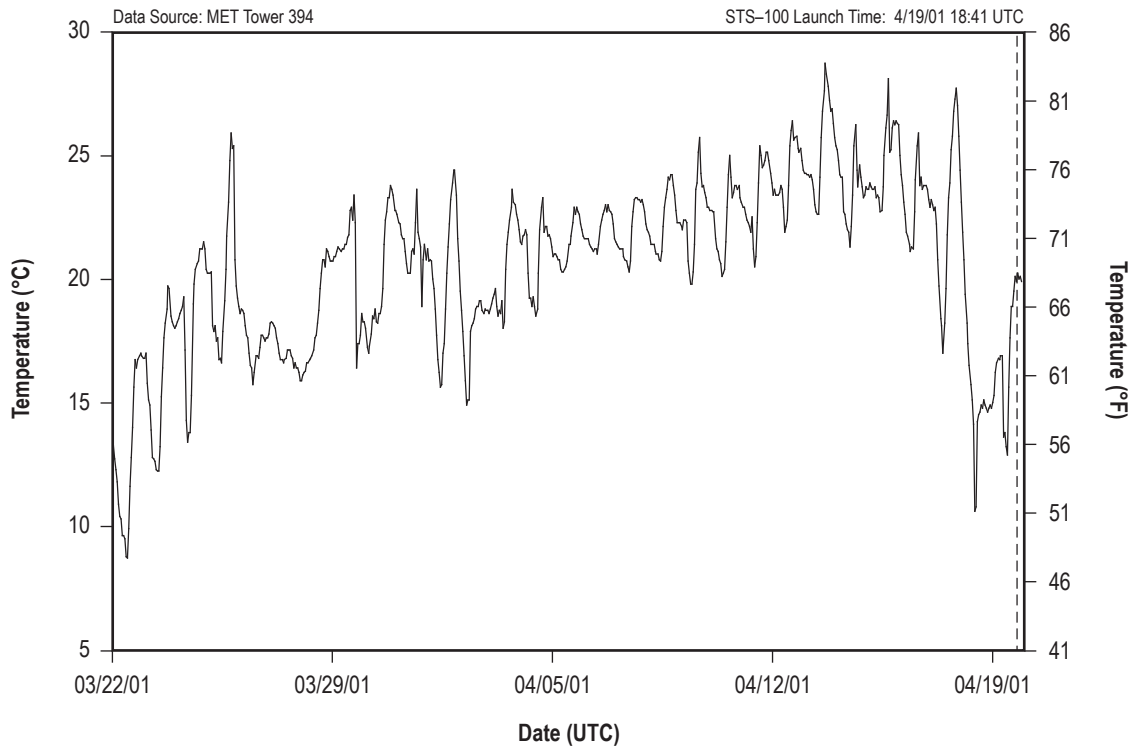


Figure 625. STS-100 hourly surface temperature.

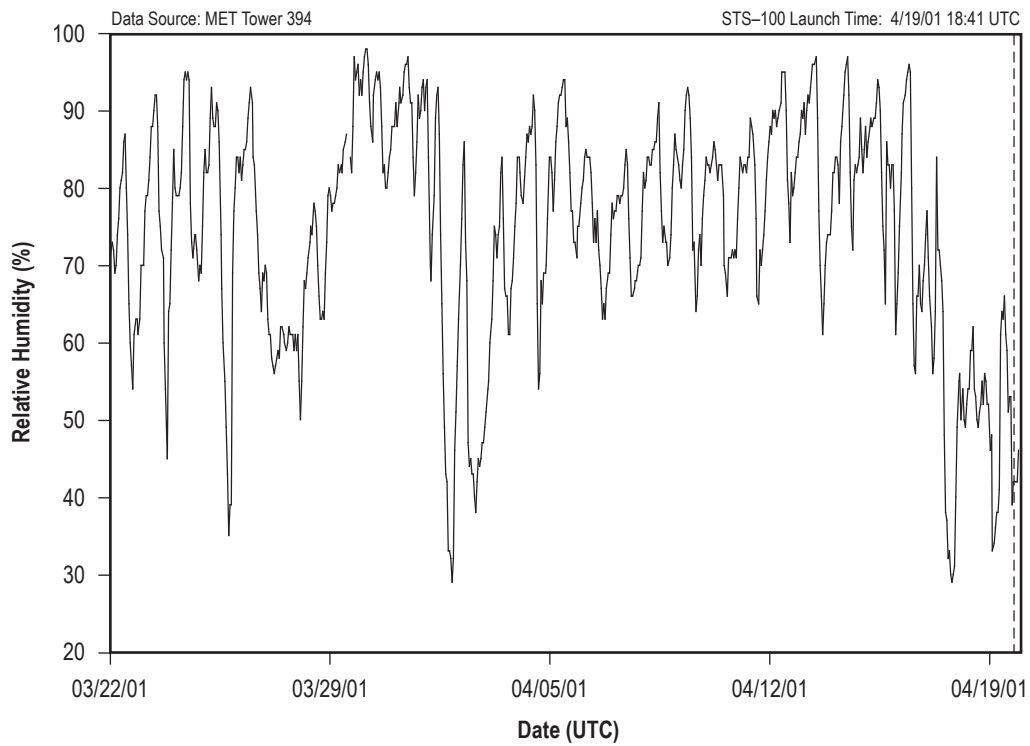


Figure 626. STS-100 hourly surface relative humidity.

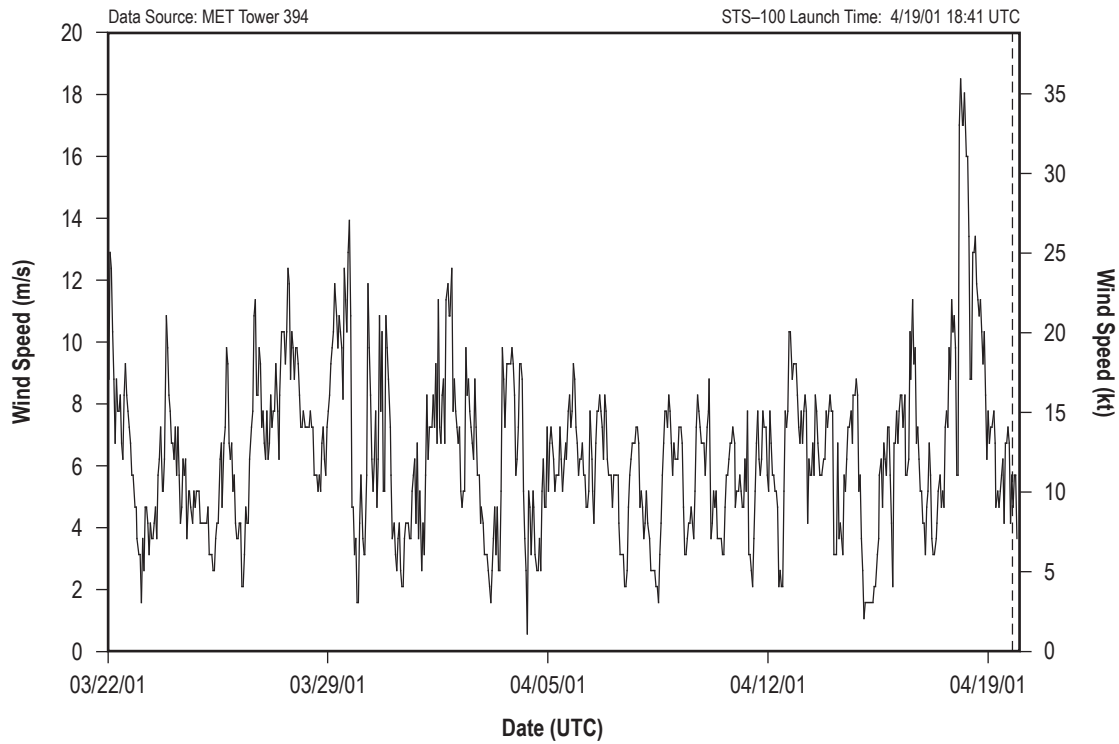


Figure 627. STS-100 hourly surface wind speed.

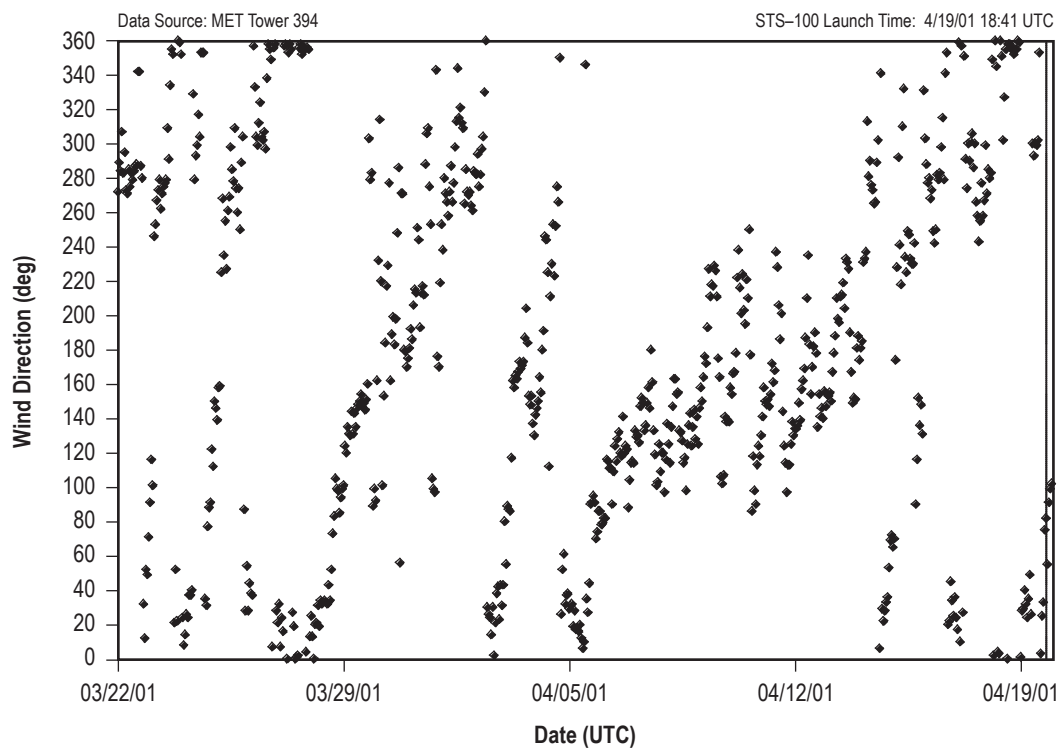


Figure 628. STS-100 hourly surface wind direction.



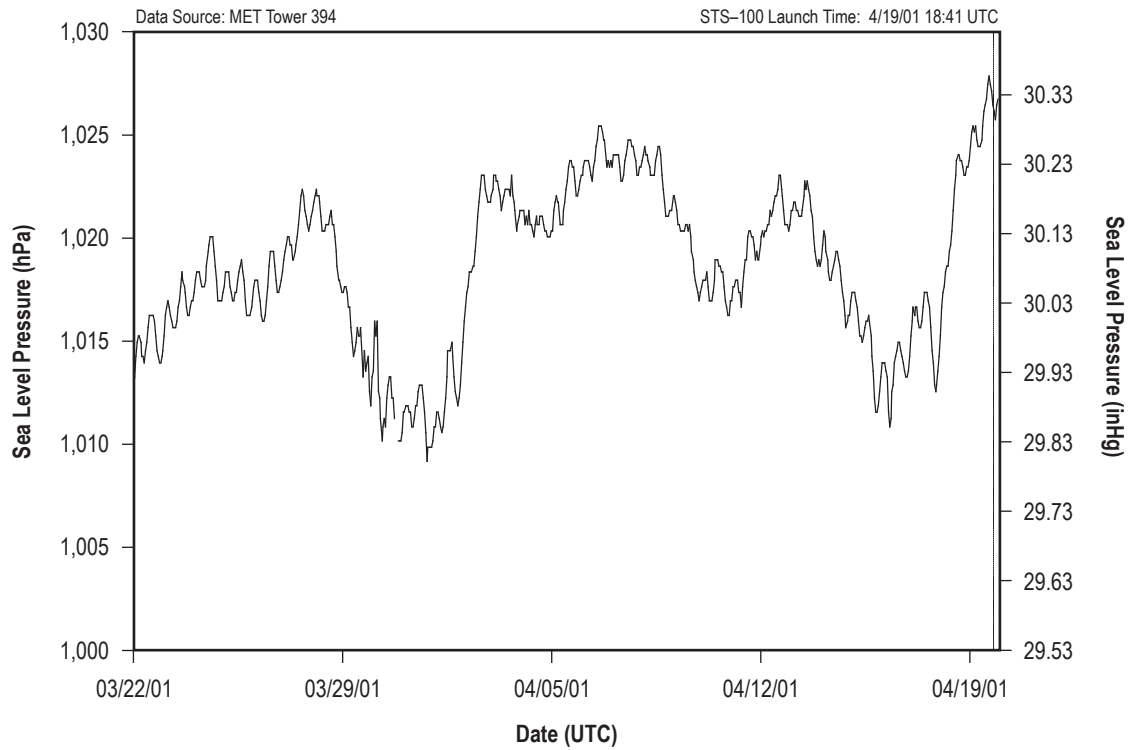


Figure 629. STS-100 hourly sea level pressure.

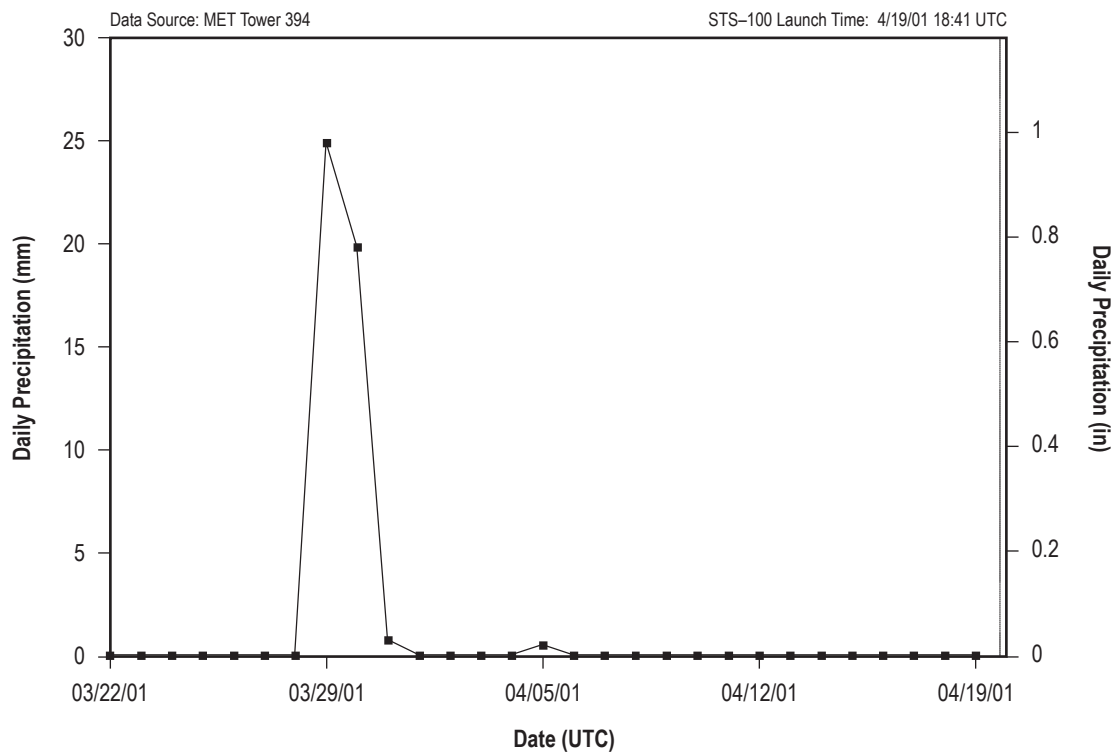


Figure 630. STS-100 daily precipitation totals.

### 5.105 STS–104

STS–104 was the 24th mission for *Atlantis* (OV–104). It rolled out to pad 39B on June 21, 2001. STS–104 was exposed on the pad for 21 days and launched on July 12, 2001, at 09:04 UTC.

#### 5.105.1 STS–104 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–104 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

#### 5.105.2 STS–104 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–104 are shown in table 213. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 213. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 213. STS–104 L–0 surface observations.

Temperature	24.7 °C (76.4 °F)
Relative humidity	95%
Sea level pressure	1,014.6 hPa (29.96 inHg)
Wind speed	4 m/s (7.7 kt) (1-min average)
Wind direction	218° (1-min average)
Sky condition	1/8 stratus at 213 m (700 ft); 1/8 altocumulus at 2,286 m (7,500 ft); 3/8 altocumulus at 4,572 m (15,000 ft)
Visibility	14.5 km (7.8 nmi)

#### 5.105.3 STS–104 Pad Exposure Period Hourly Meteorological Parameters

Figures 631–636 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–104 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 214. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 398.

Table 214. STS–104 pad exposure period hourly extremes.

Minimum temperature	20.6 °C (69 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	51%
Maximum relative humidity	96%
Minimum sea level pressure	1,011.8 hPa (29.88 inHg)
Maximum sea level pressure	1,026.4 hPa (30.31 inHg)
Maximum wind speed and associated wind direction	16 m/s (31 kt) 54°
Total precipitation	54.6 mm (2.15 in)

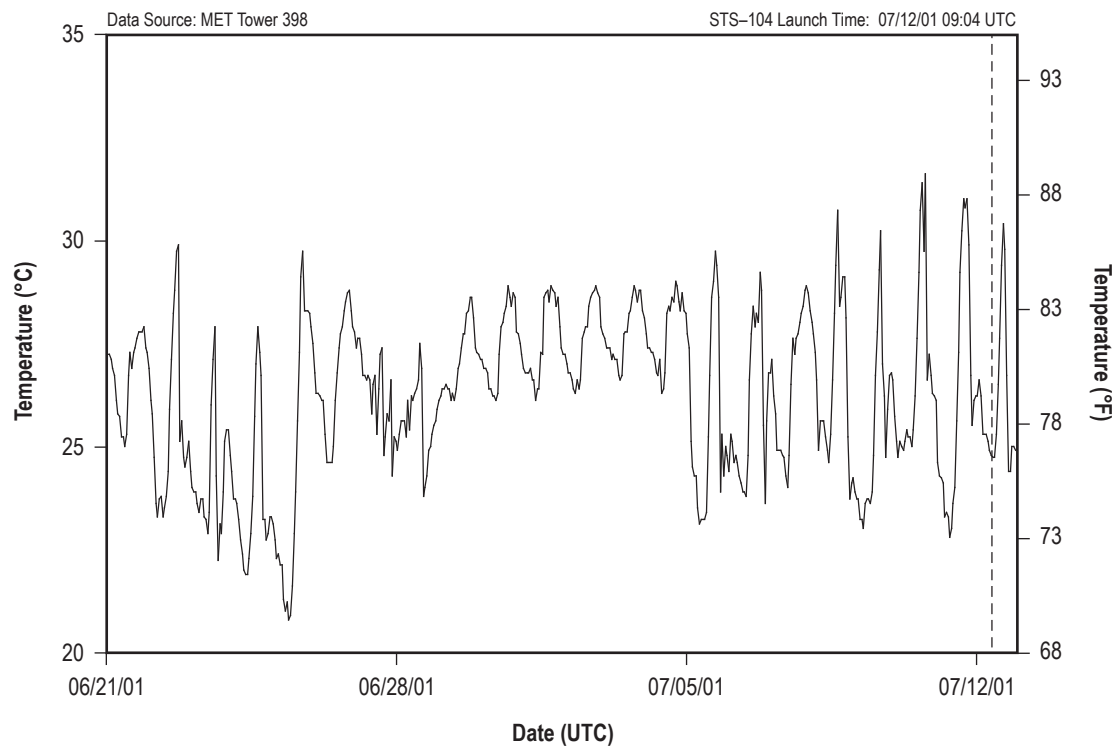


Figure 631. STS-104 hourly surface temperature.

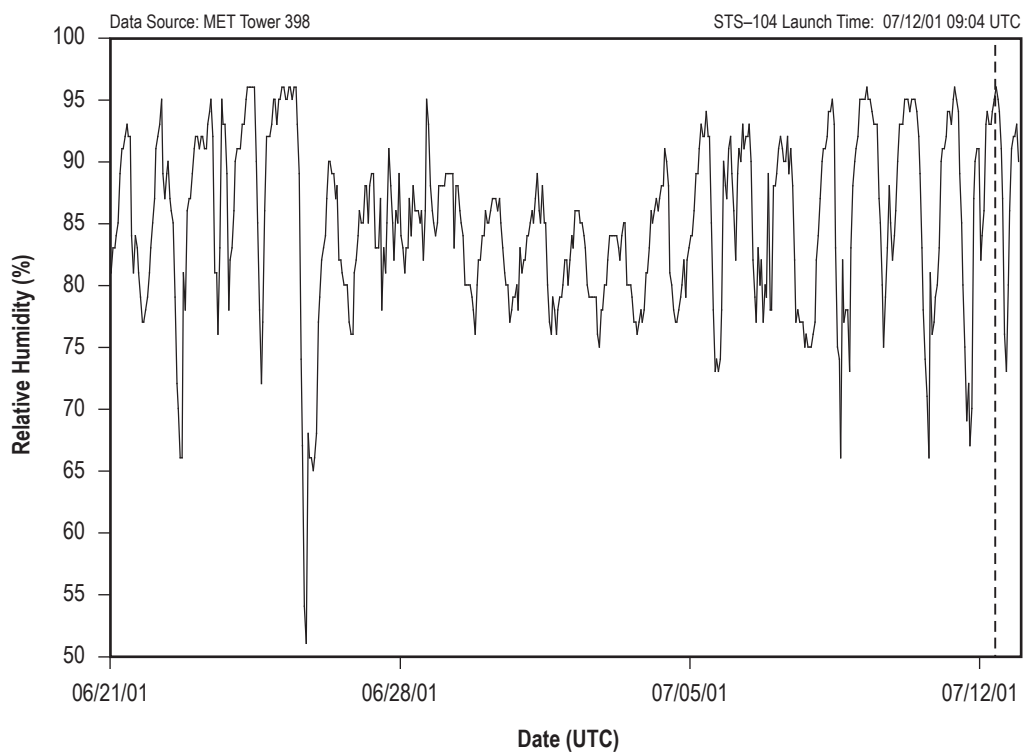


Figure 632. STS-104 hourly surface relative humidity.

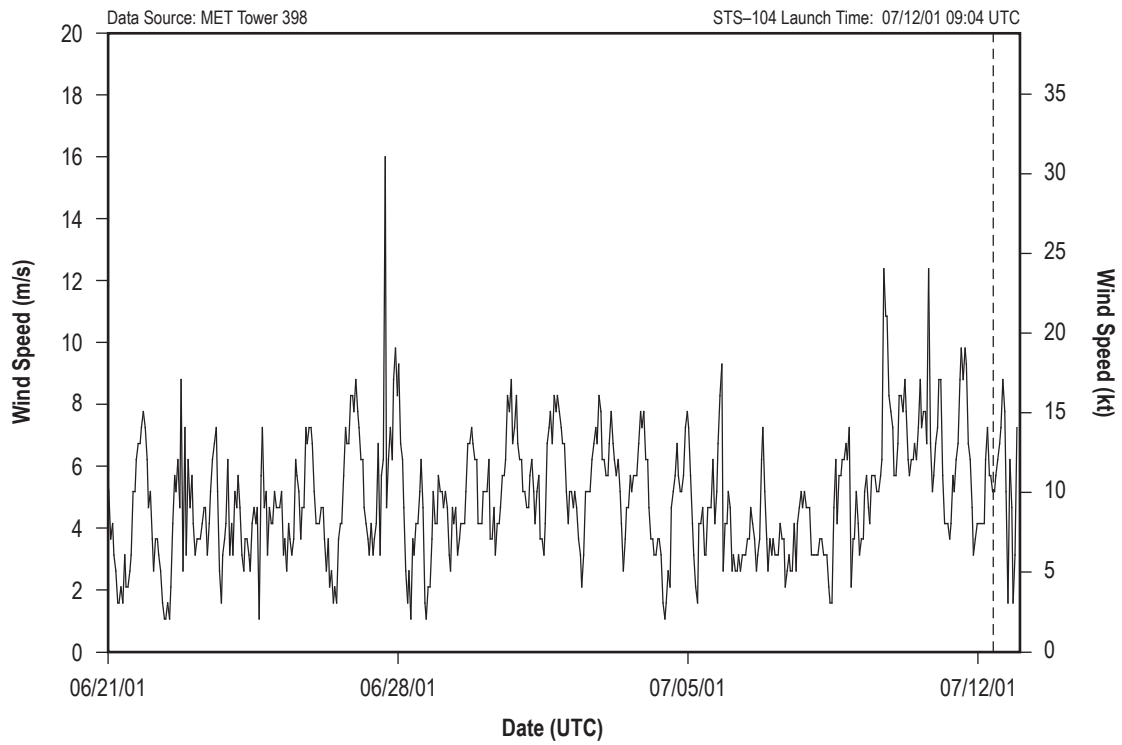


Figure 633. STS-104 hourly surface wind speed.

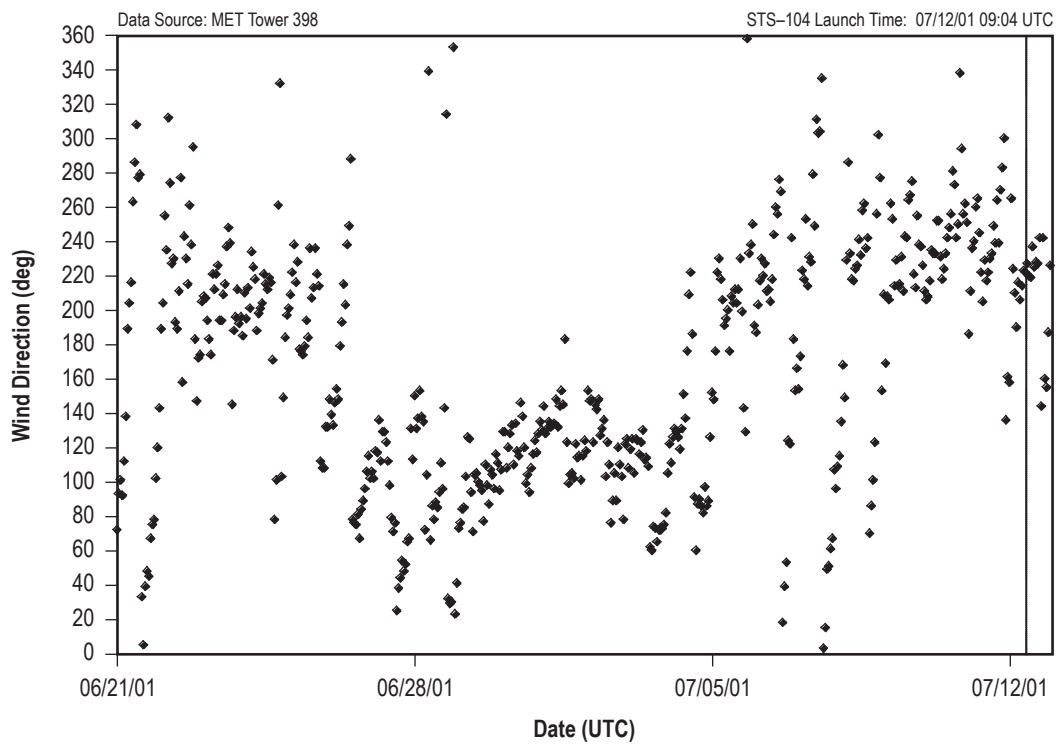


Figure 634. STS-104 hourly surface wind direction.

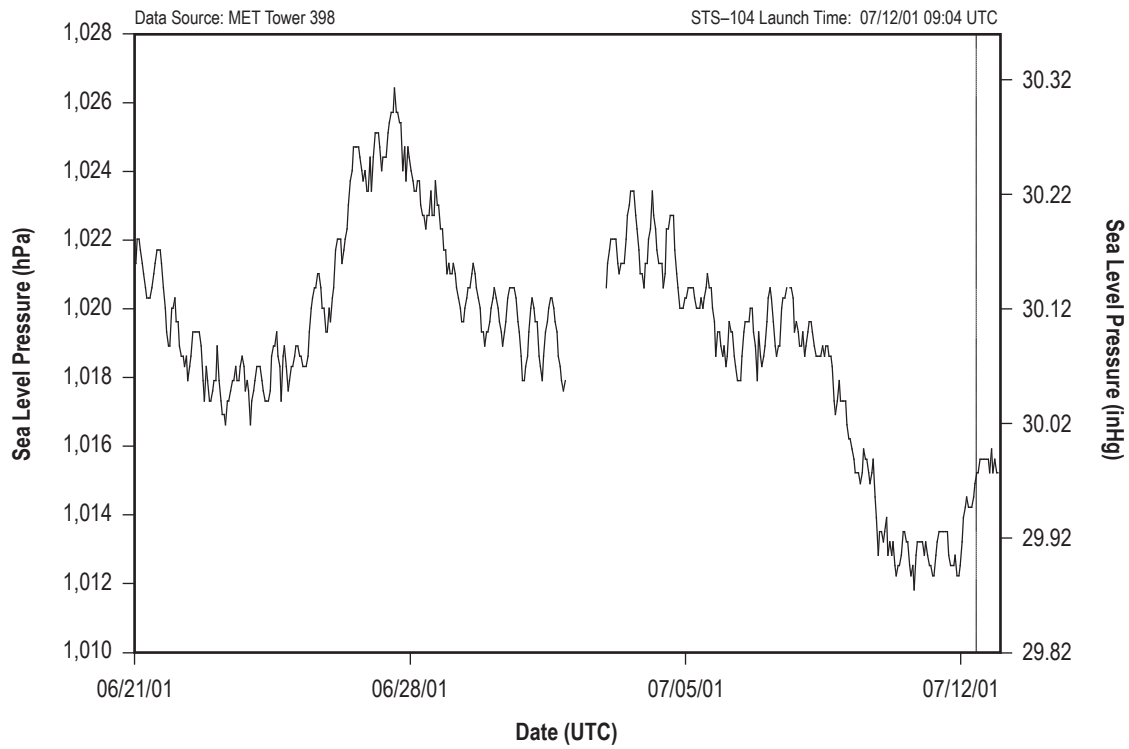


Figure 635. STS-104 hourly sea level pressure.

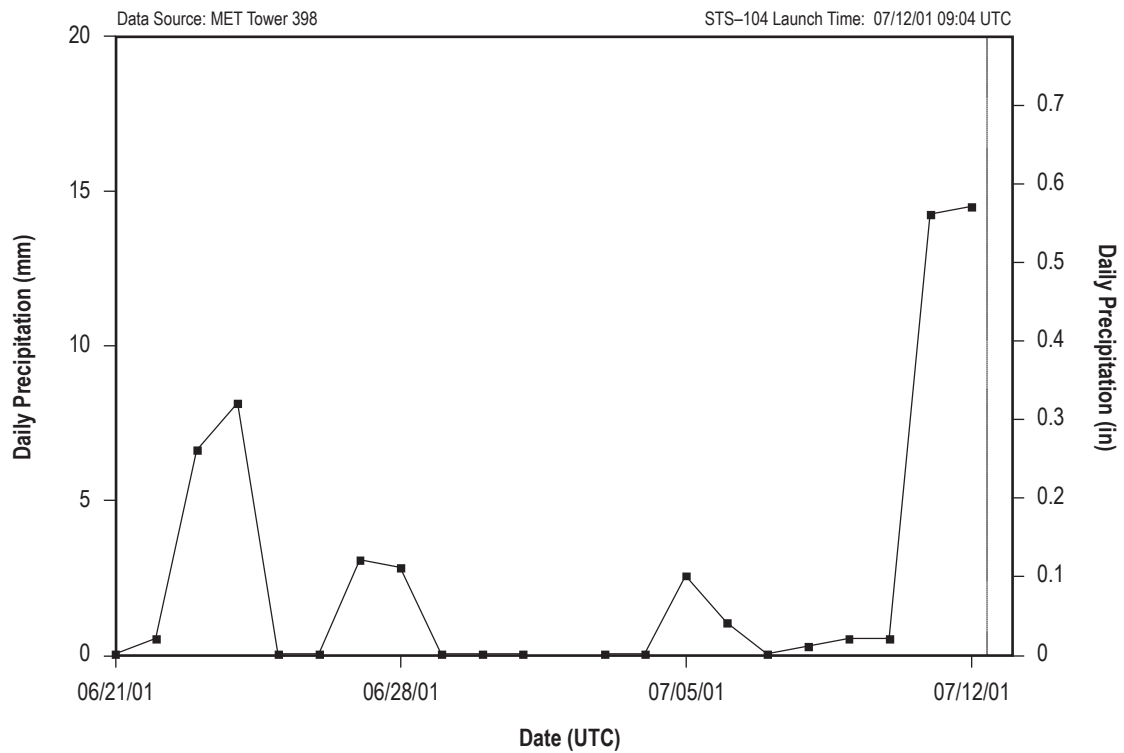


Figure 636. STS-104 daily precipitation totals.

## 5.106 STS–105

STS–105 was the 30th mission for *Discovery* (OV–103). It rolled out to pad 39A on July 2, 2001. STS–105 was exposed on the pad for 40 days and launched on August 10, 2001, at 21:10 UTC.

### 5.106.1 STS–105 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–105 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.106.2 STS–105 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–105 are shown in table 215. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 215. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 215. STS–105 L–0 surface observations.

Temperature	29.1 °C (84.4 °F)
Relative humidity	76%
Sea level pressure	1,016.6 hPa (30.02 inHg)
Wind speed	4.9 m/s (9.5 kt) (1-min average)
Wind direction	103° (1-min average)
Sky condition	1/8 towering cumulus at 914 m (3,000 ft); 1/8 cirrus at 9,144 m (30,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.106.3 STS–105 Pad Exposure Period Hourly Meteorological Parameters

Figures 637–642 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–105 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 216. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 216. STS–105 pad exposure period hourly extremes.

Minimum temperature	22.2 °C (72 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	60%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.8 hPa (29.82 inHg)
Maximum sea level pressure	1,024 hPa (30.24 inHg)
Maximum wind speed and associated wind direction	16 m/s (31 kt) 180°
Total precipitation	115.1 mm (4.53 in)

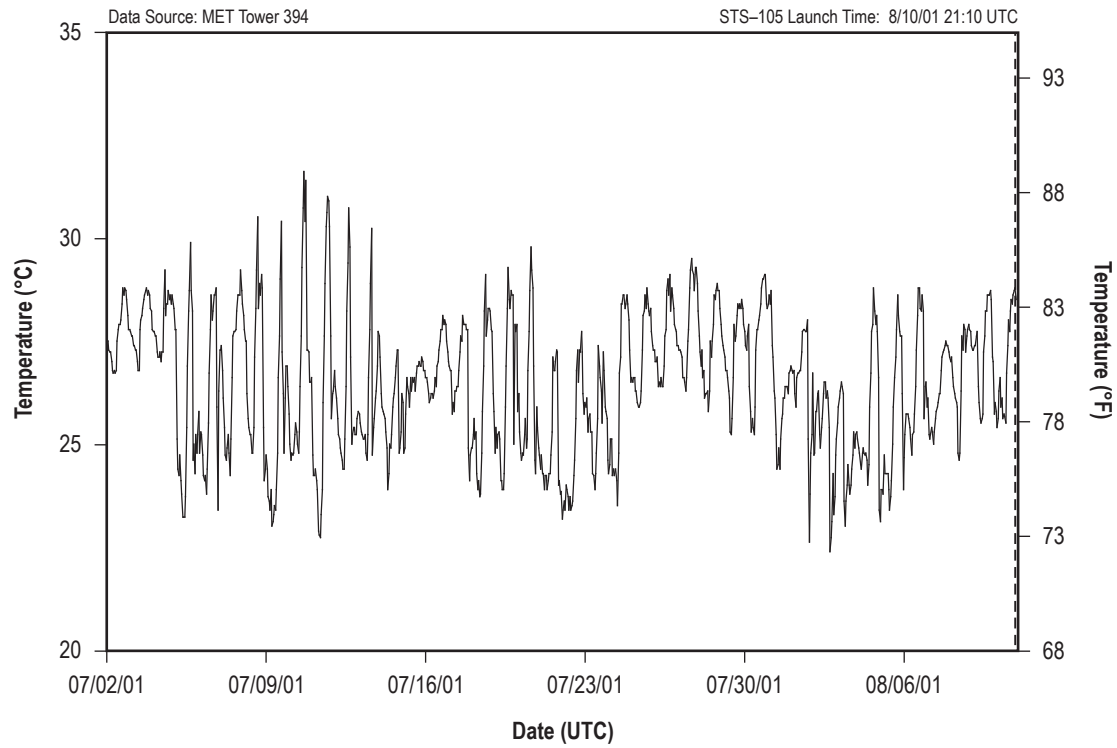


Figure 637. STS-105 hourly surface temperature.

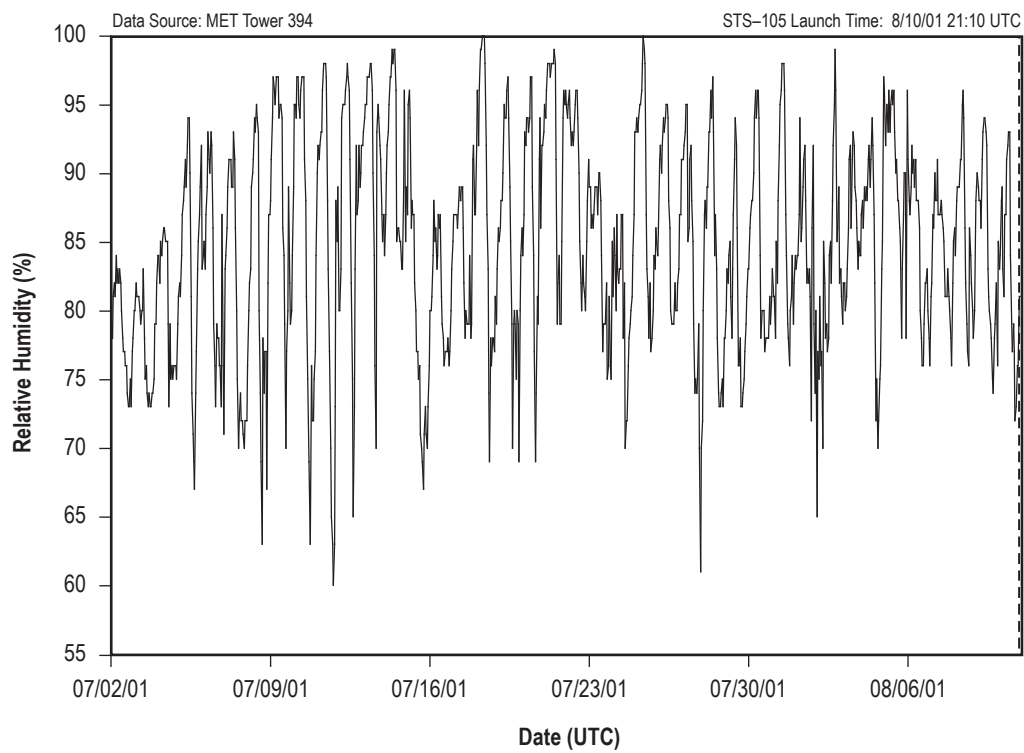


Figure 638. STS-105 hourly surface relative humidity.

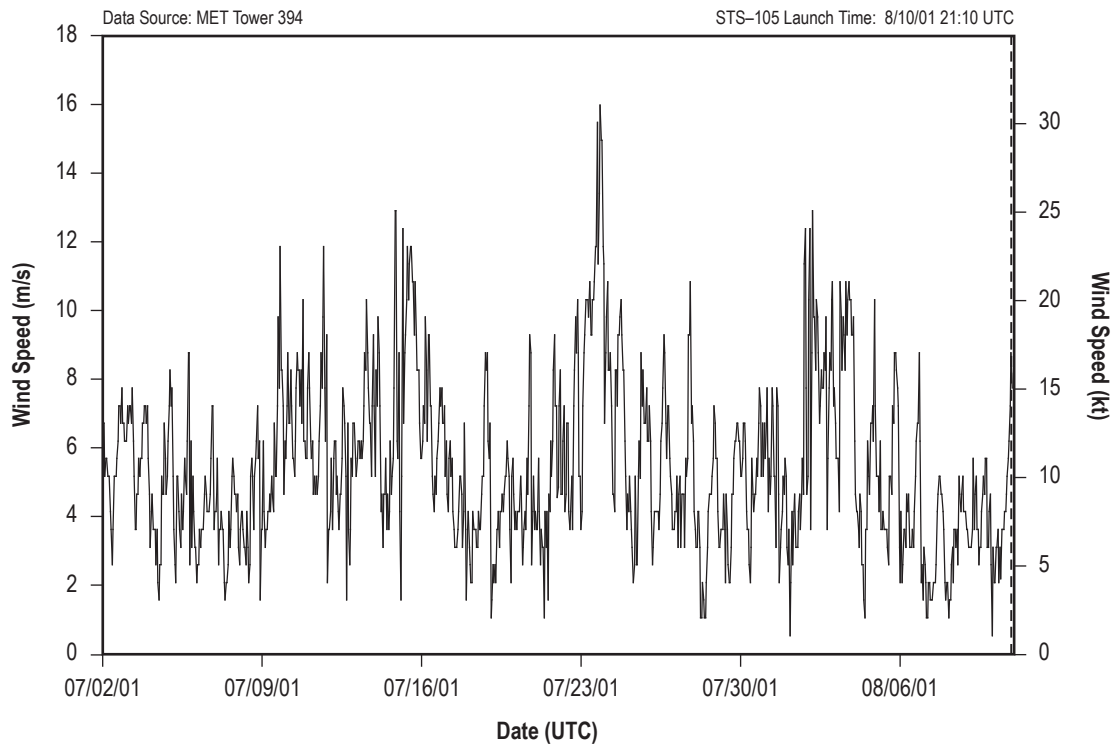


Figure 639. STS-105 hourly surface wind speed.

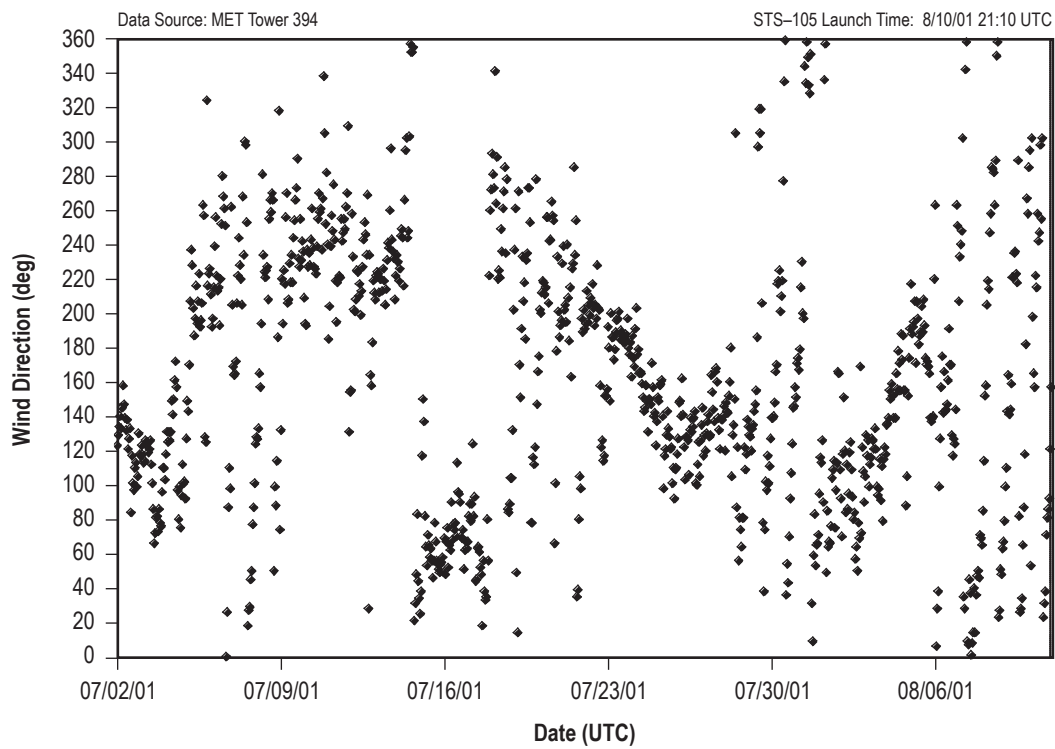


Figure 640. STS-105 hourly surface wind direction.



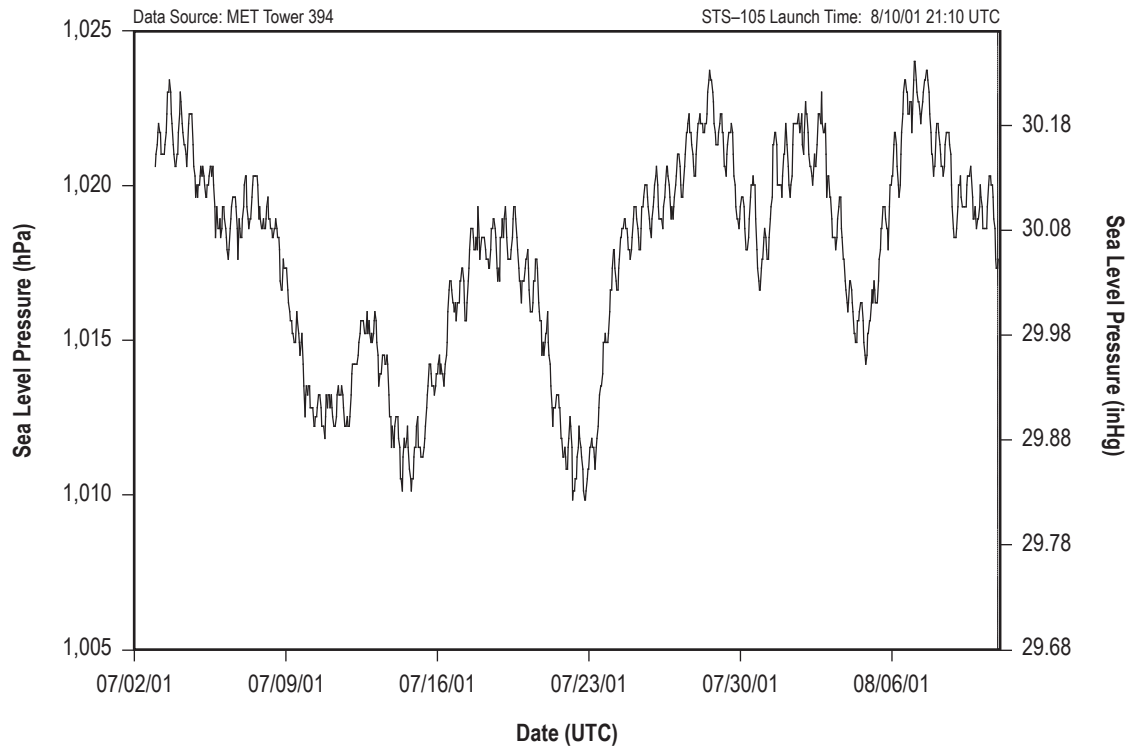


Figure 641. STS-105 hourly sea level pressure.

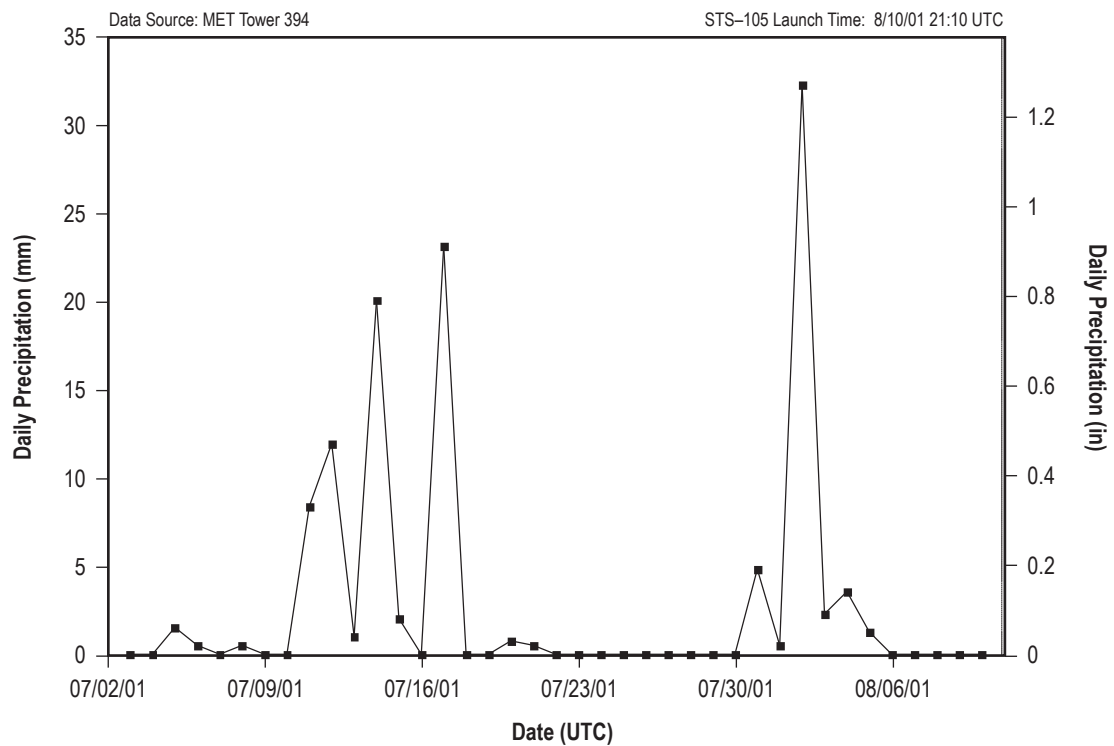


Figure 642. STS-105 daily precipitation totals.

## 5.107 STS–108

STS–108 was the 17th mission for *Endeavour* (OV–105). It rolled out to pad 39B on October 31, 2001. STS–108 was exposed on the pad for 36 days and launched on December 5, 2001, at 22:19 UTC.

### 5.107.1 STS–108 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–108 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.107.2 STS–108 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–108 are shown in table 217. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 217. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 217. STS–108 L–0 surface observations.

Temperature	23.2 °C (73.7 °F)
Relative humidity	80%
Sea level pressure	1,023.4 hPa (30.22 inHg)
Wind speed	7.2 m/s (13.9 kt) (1-min average)
Wind direction	52° (1-min average)
Sky condition	2/8 cumulus at 914 m (3,000 ft); 5/8 stratocumulus at 1,829 m (6,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.107.3 STS–108 Pad Exposure Period Hourly Meteorological Parameters

Figures 643–648 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–108 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 218. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 398.

Table 218. STS–108 pad exposure period hourly extremes.

Minimum temperature	15 °C (59 °F)
Maximum temperature	25.6 °C (78 °F)
Minimum relative humidity	52%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.8 hPa (29.76 inHg)
Maximum sea level pressure	1,027.1 hPa (30.33 inHg)
Maximum wind speed and associated wind direction	26.3 m/s (51 kt) 355°
Total precipitation	143.2 mm (5.64 in)

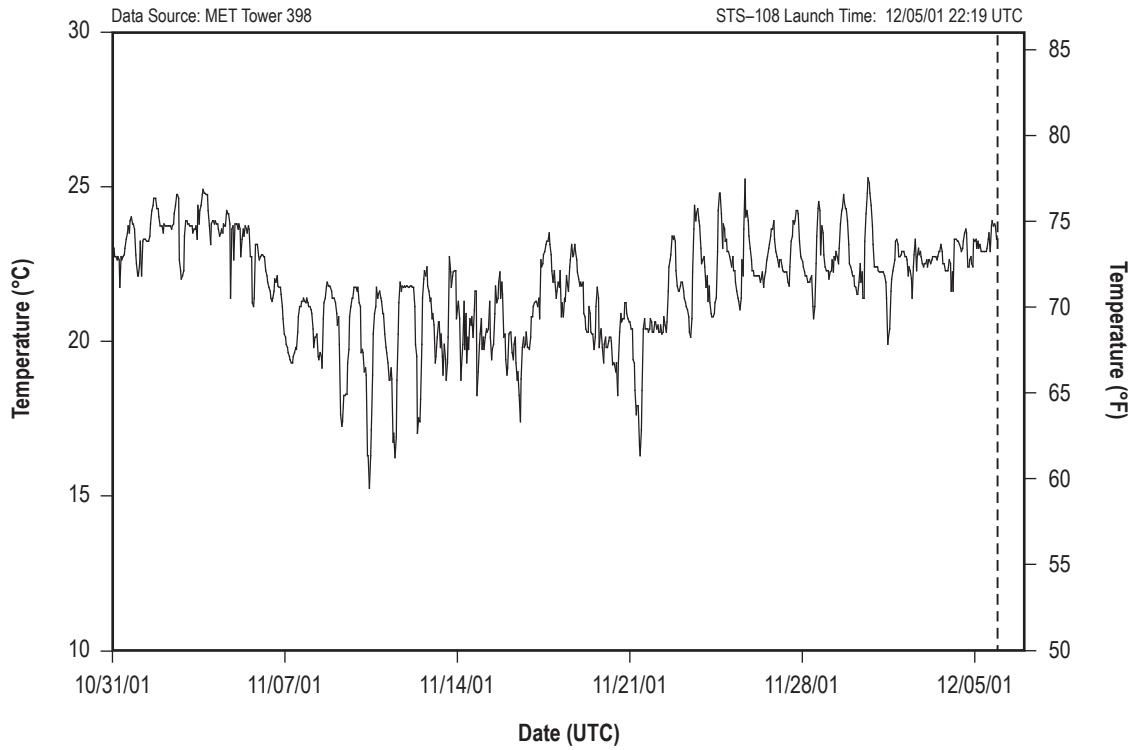


Figure 643. STS-108 hourly surface temperature.

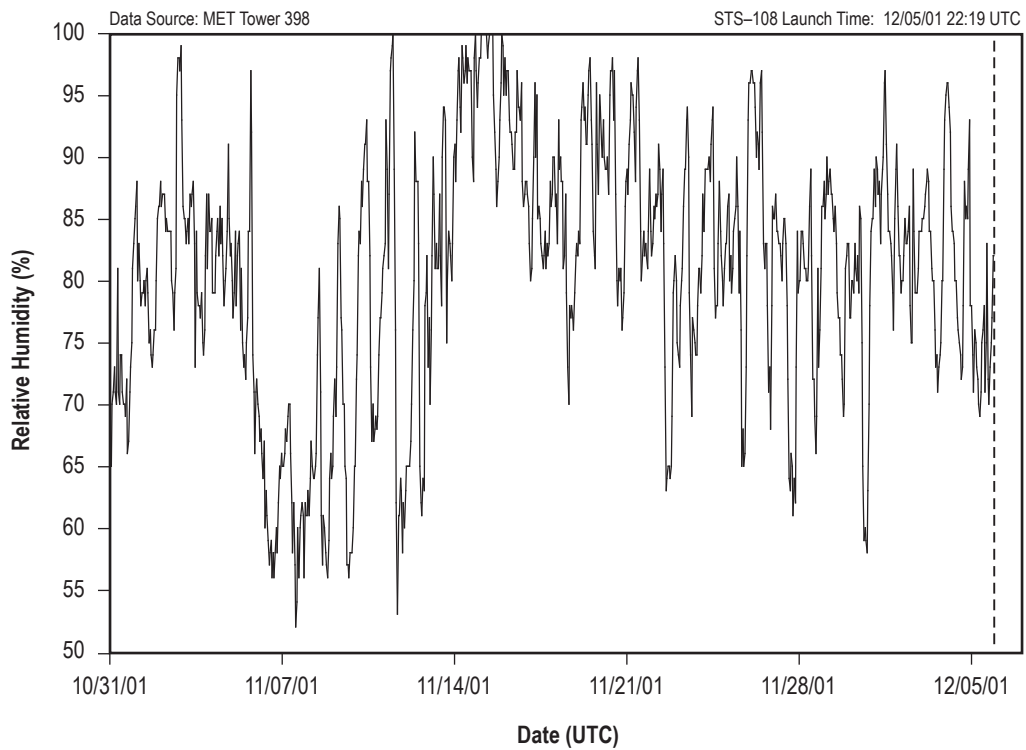


Figure 644. STS-108 hourly surface relative humidity.

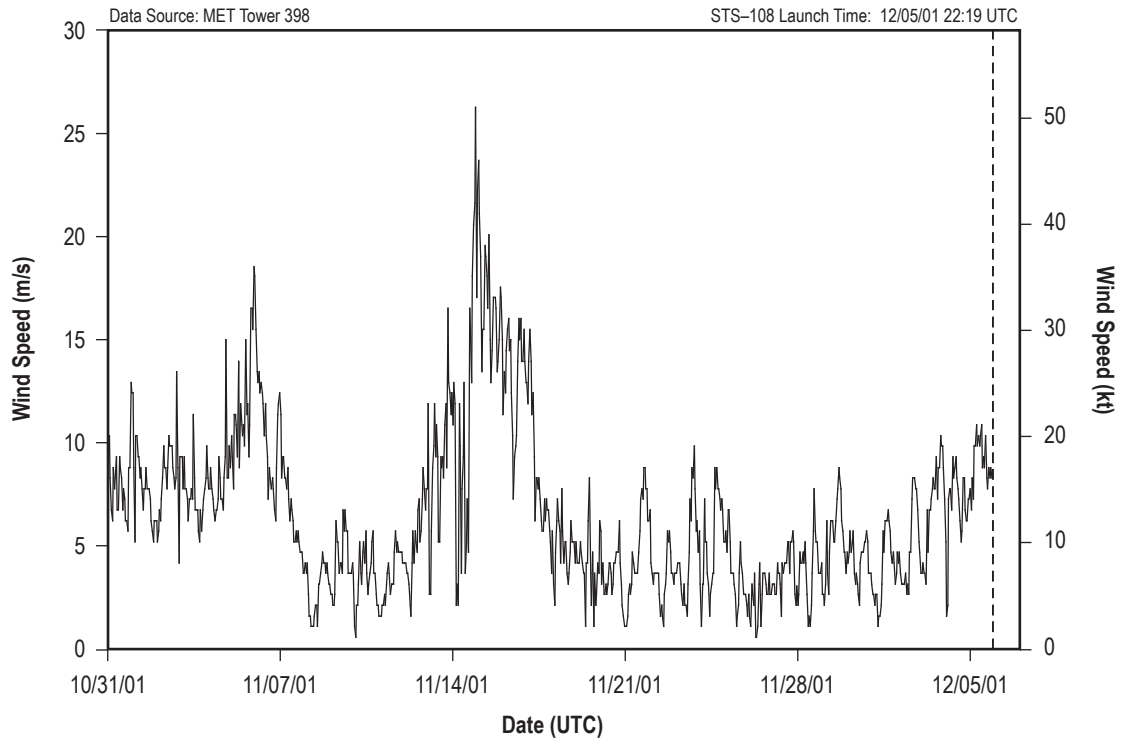


Figure 645. STS-108 hourly surface wind speed.

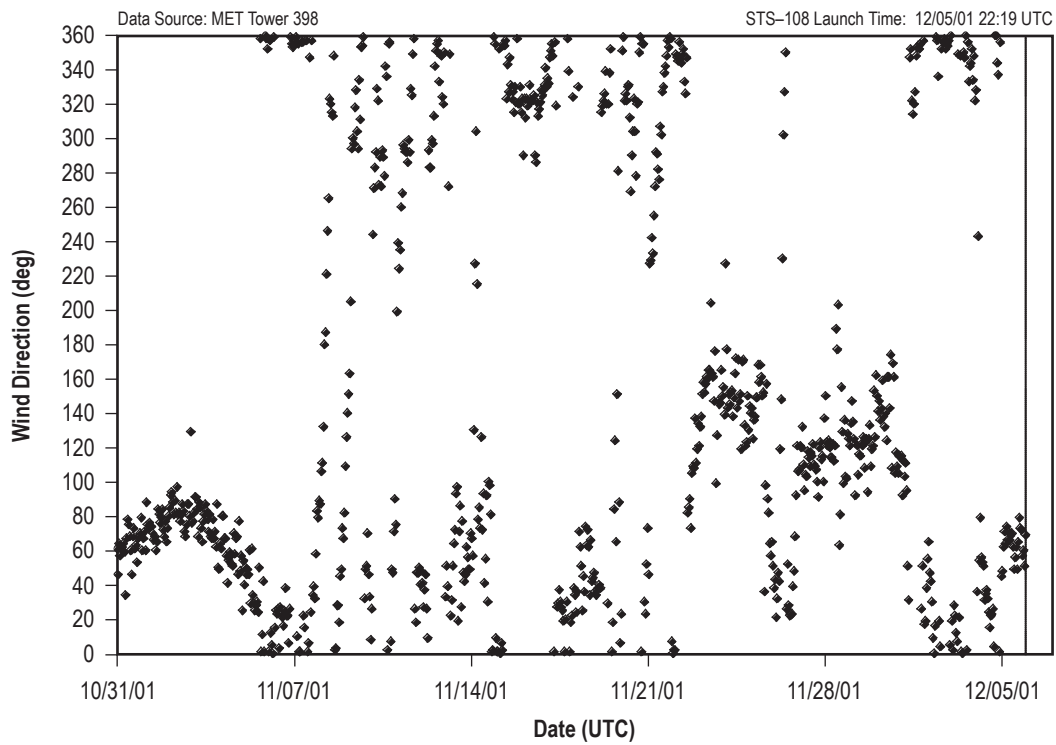


Figure 646. STS-108 hourly surface wind direction.

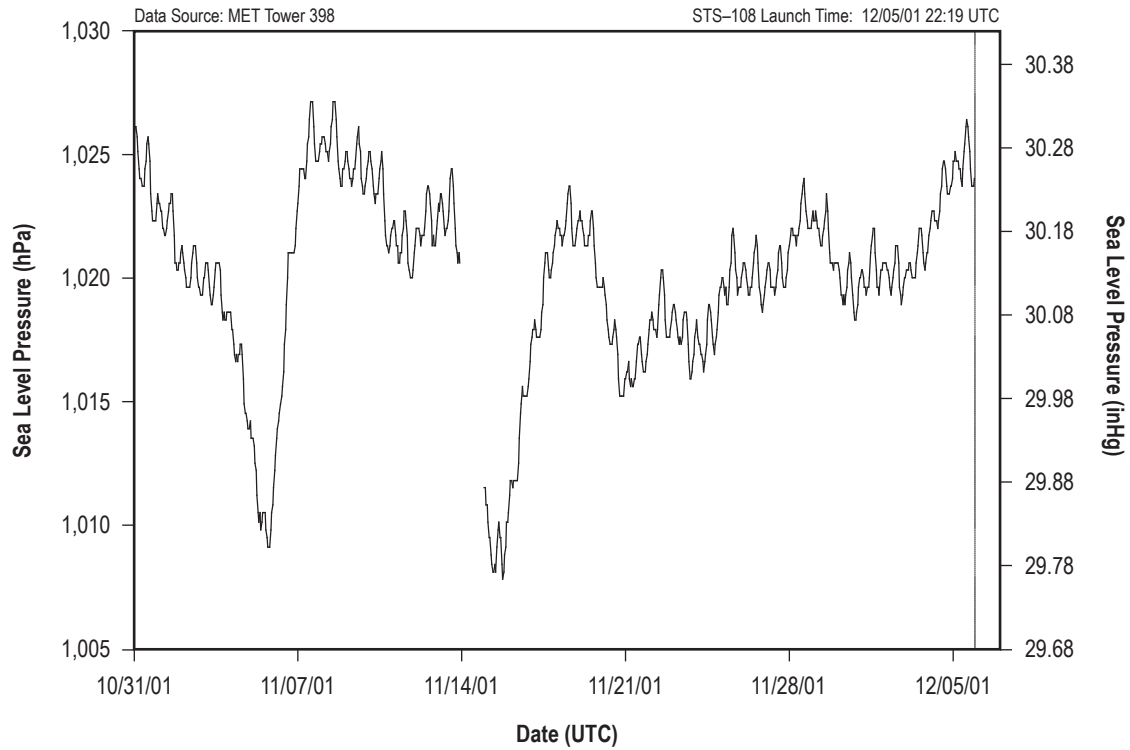


Figure 647. STS-108 hourly sea level pressure.

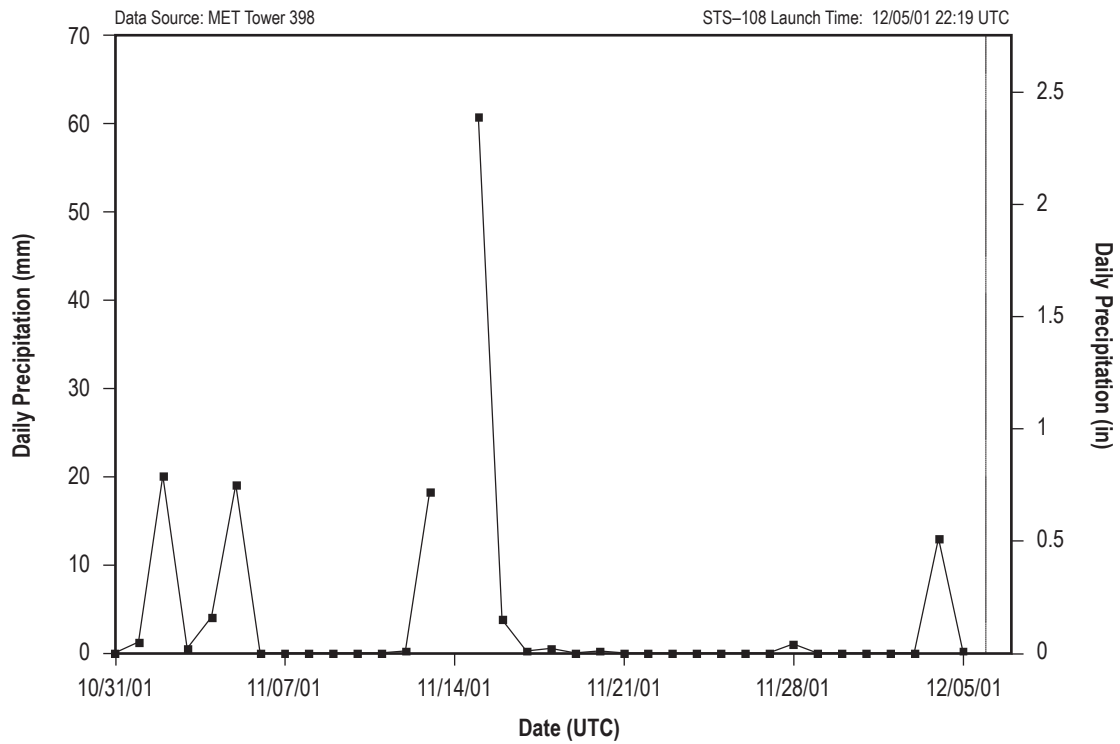


Figure 648. STS-108 daily precipitation totals.

## 5.108 STS–109

STS–109 was the 27th mission for *Columbia* (OV–102). It rolled out to pad 39A on January 28, 2002. STS–109 was exposed on the pad for 32 days and launched on March 1, 2002, at 11:22 UTC.

### 5.108.1 STS–109 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–109 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.108.2 STS–109 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–109 are shown in table 219. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 219. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 219. STS–109 L–0 surface observations.

Temperature	15.6 °C (60 °F)
Relative humidity	73%
Sea level pressure	1,025.7 hPa (30.29 inHg)
Wind speed	6.3 m/s (12.2 kt) (1-min average)
Wind direction	66° (1-min average)
Sky condition	1/8 stratocumulus at 1,006 m (3,300 ft); 3/8 stratocumulus at 1,829 m (6,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.108.3 STS–109 Pad Exposure Period Hourly Meteorological Parameters

Figures 649–654 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–109 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 220. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 220. STS–109 pad exposure period hourly extremes.

Minimum temperature	3.3 °C (38 °F)
Maximum temperature	25 °C (77 °F)
Minimum relative humidity	24%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.8 hPa (29.76 inHg)
Maximum sea level pressure	1,028.4 hPa (30.37 inHg)
Maximum wind speed and associated wind direction	24.2 m/s (47 kt) 345°
Total precipitation	97.3 mm (3.83 in)

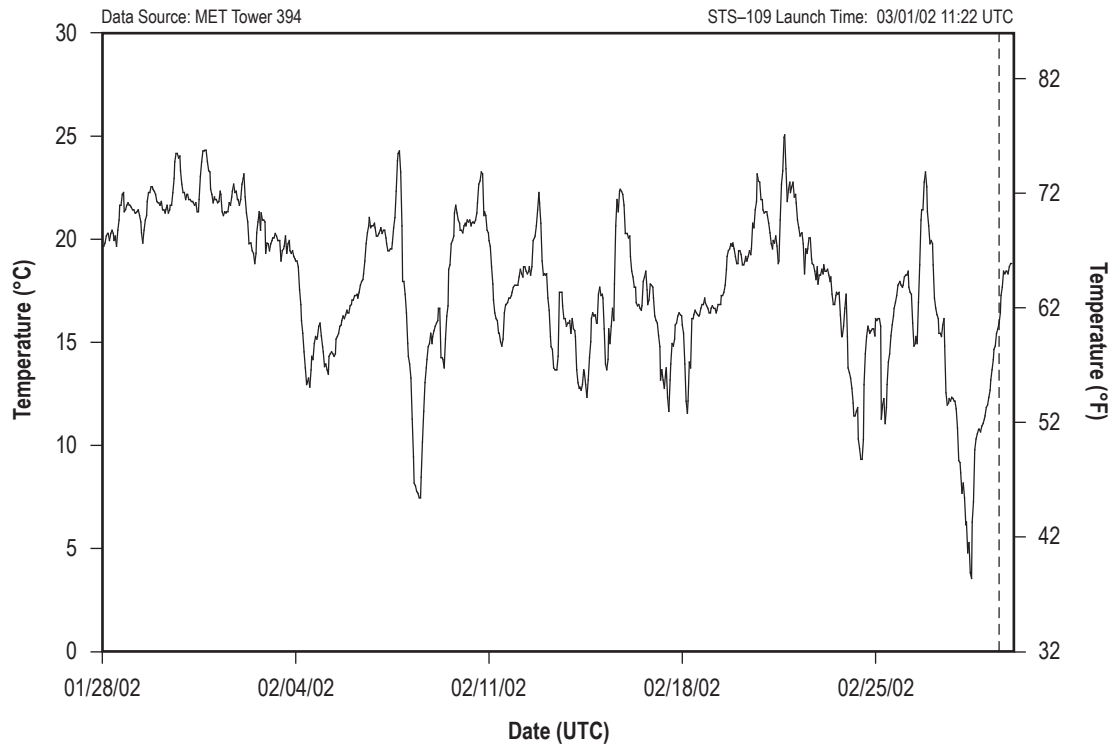


Figure 649. STS-109 hourly surface temperature.

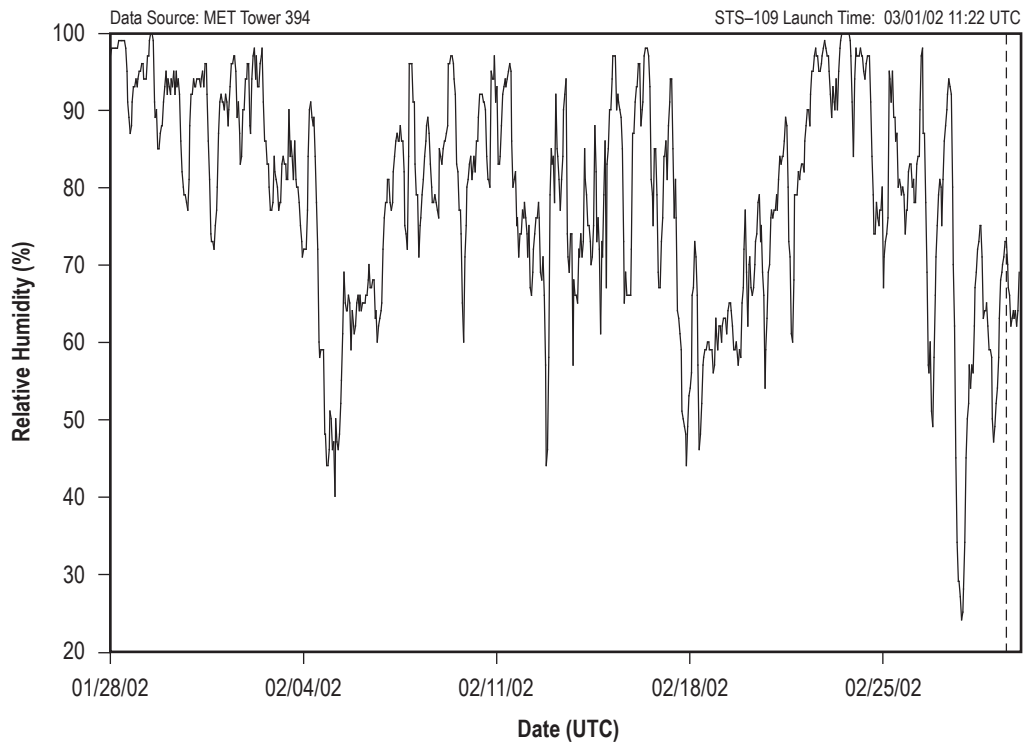


Figure 650. STS-109 hourly surface relative humidity.

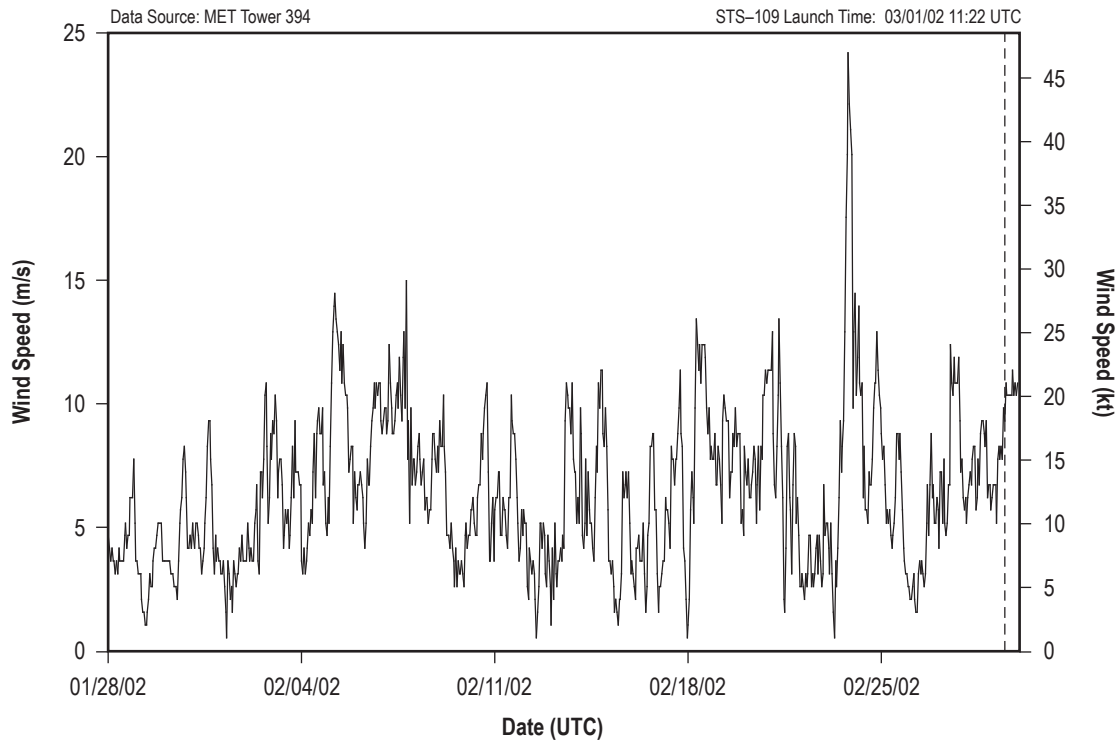


Figure 651. STS-109 hourly surface wind speed.

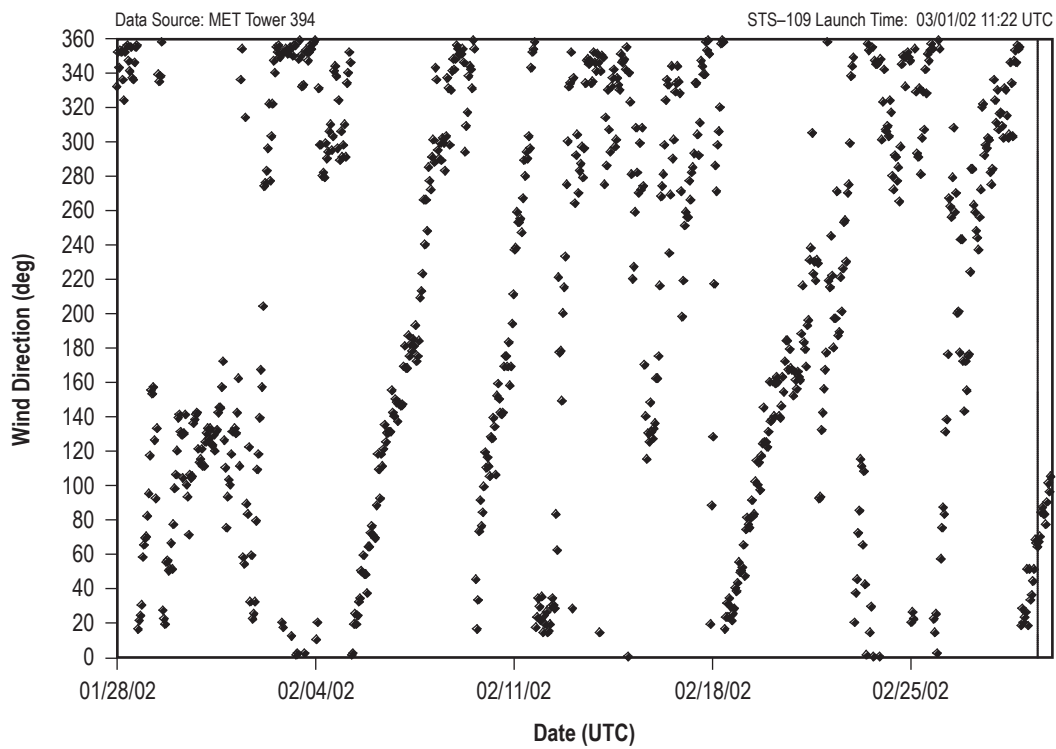


Figure 652. STS-109 hourly surface wind direction.



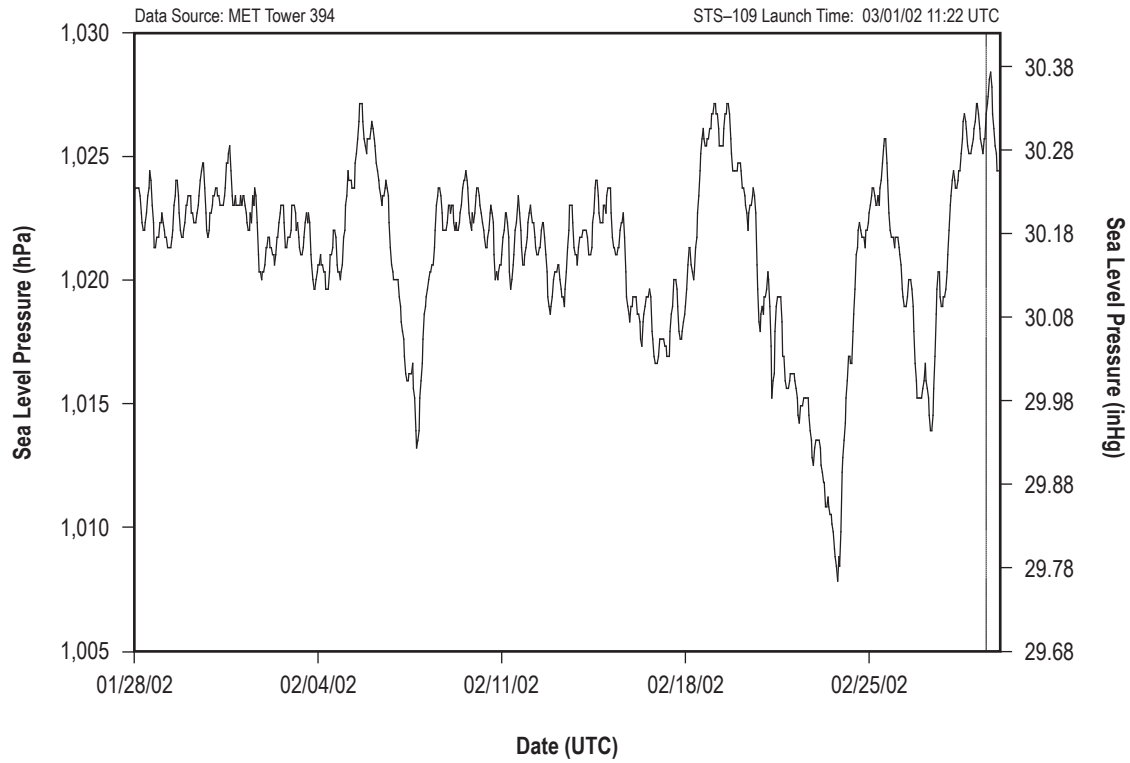


Figure 653. STS-109 hourly sea level pressure.

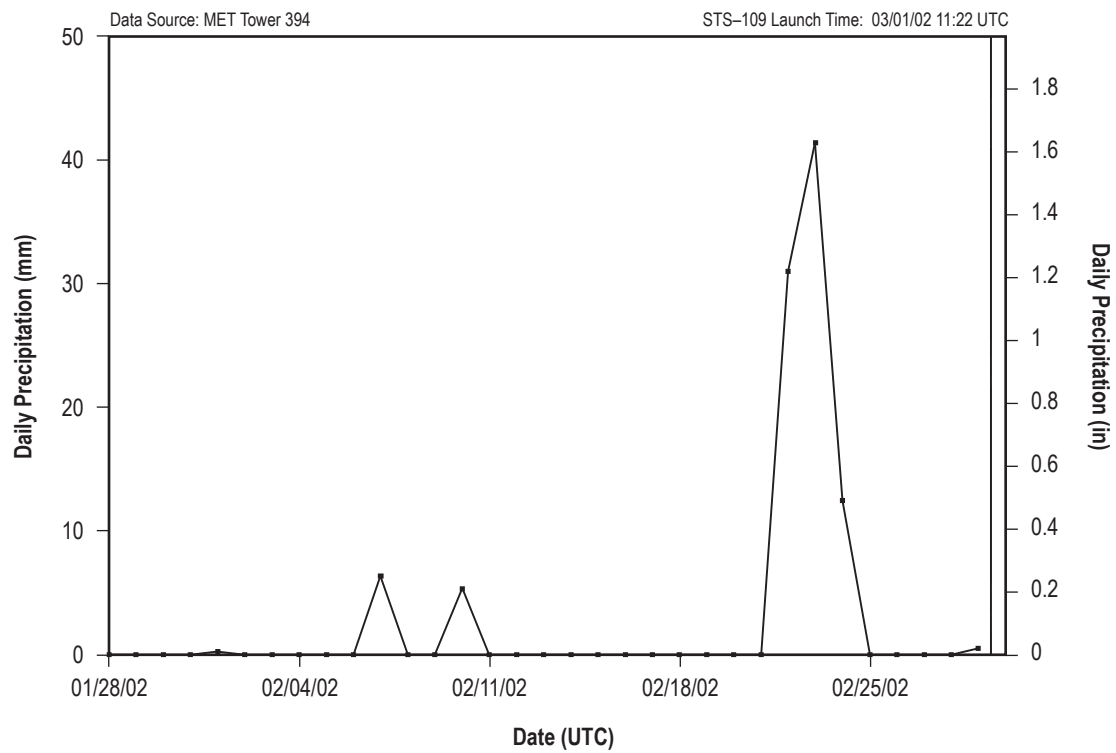


Figure 654. STS-109 daily precipitation totals.

## 5.109 STS–110

STS–110 was the 25th mission for *Atlantis* (OV–104). It rolled out to pad 39B on March 12, 2002. STS–110 was exposed on the pad for 28 days and launched on April 8, 2002, at 20:44 UTC.

### 5.109.1 STS–110 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–110 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.109.2 STS–110 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–110 are shown in table 221. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 221. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 221. STS–110 L–0 surface observations.

Temperature	24.4 °C (76 °F)
Relative humidity	51%
Sea level pressure	1,023.4 hPa (30.22 inHg)
Wind speed	7.9 m/s (15.4 kt) (1-min average)
Wind direction	131° (1-min average)
Sky condition	1/8 stratocumulus at 1,067 m (3,500 ft); 1/8 cirrus at 6,096 m (20,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.109.3 STS–110 Pad Exposure Period Hourly Meteorological Parameters

Figures 655–660 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–110 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 222. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 398.

Table 222. STS–110 pad exposure period hourly extremes.

Minimum temperature	13.3 °C (56 °F)
Maximum temperature	28.3 °C (83 °F)
Minimum relative humidity	34%
Maximum relative humidity	99%
Minimum sea level pressure	1,011.5 hPa (29.87 inHg)
Maximum sea level pressure	1,027.1 hPa (30.33 inHg)
Maximum wind speed and associated wind direction	14.9 m/s (29 kt) 253°
Total precipitation	29.5 mm (1.16 in)

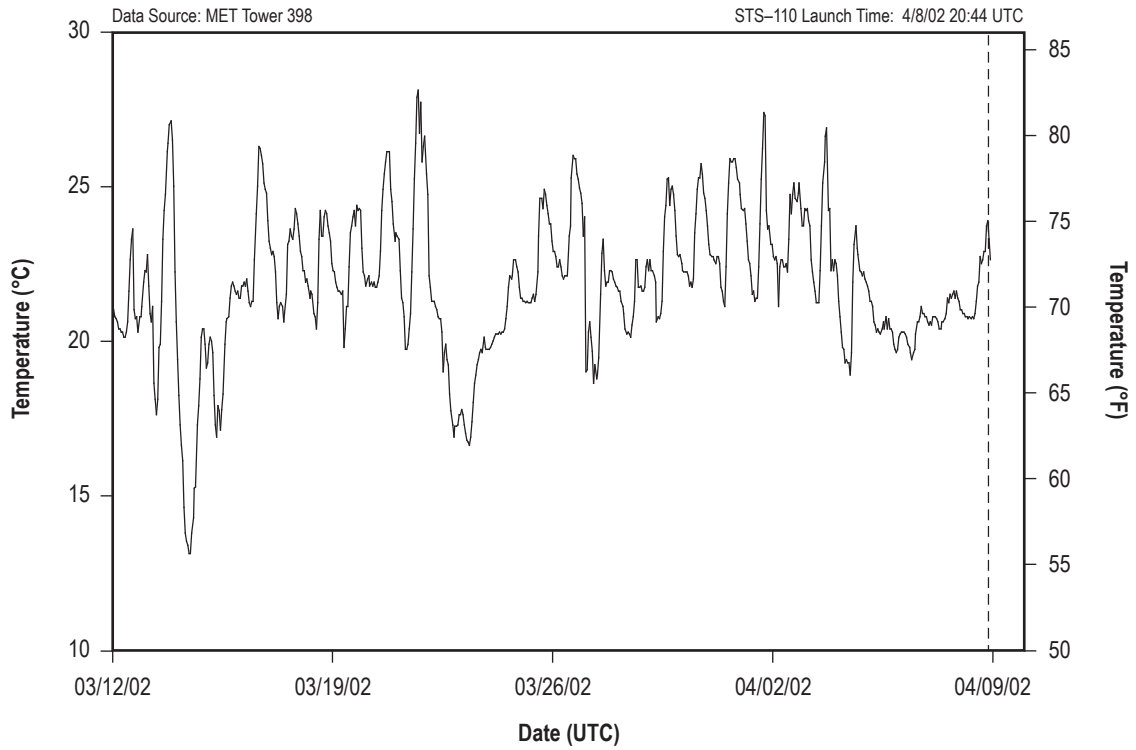


Figure 655. STS-110 hourly surface temperature.

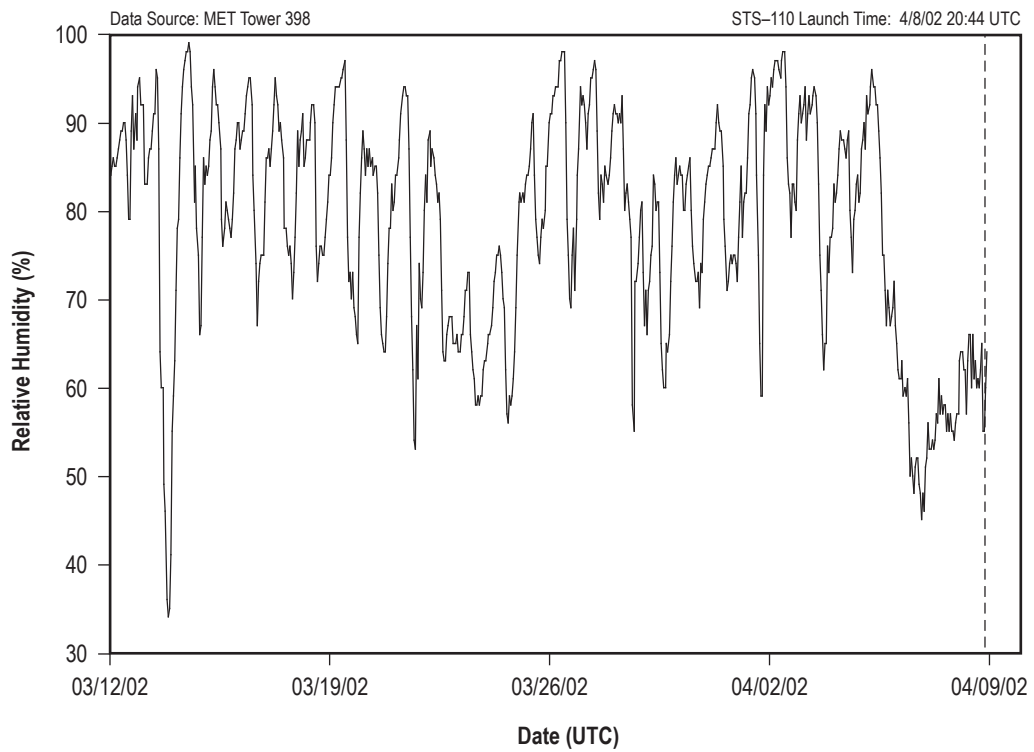


Figure 656. STS-110 hourly surface relative humidity.

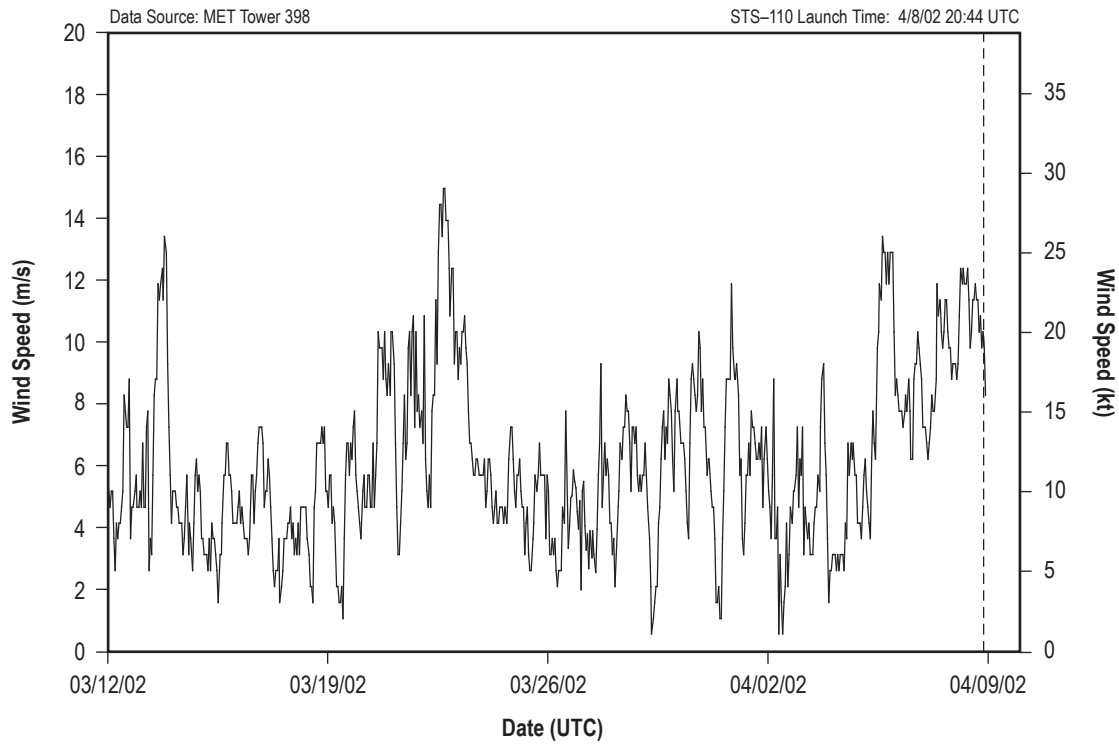


Figure 657. STS-110 hourly surface wind speed.

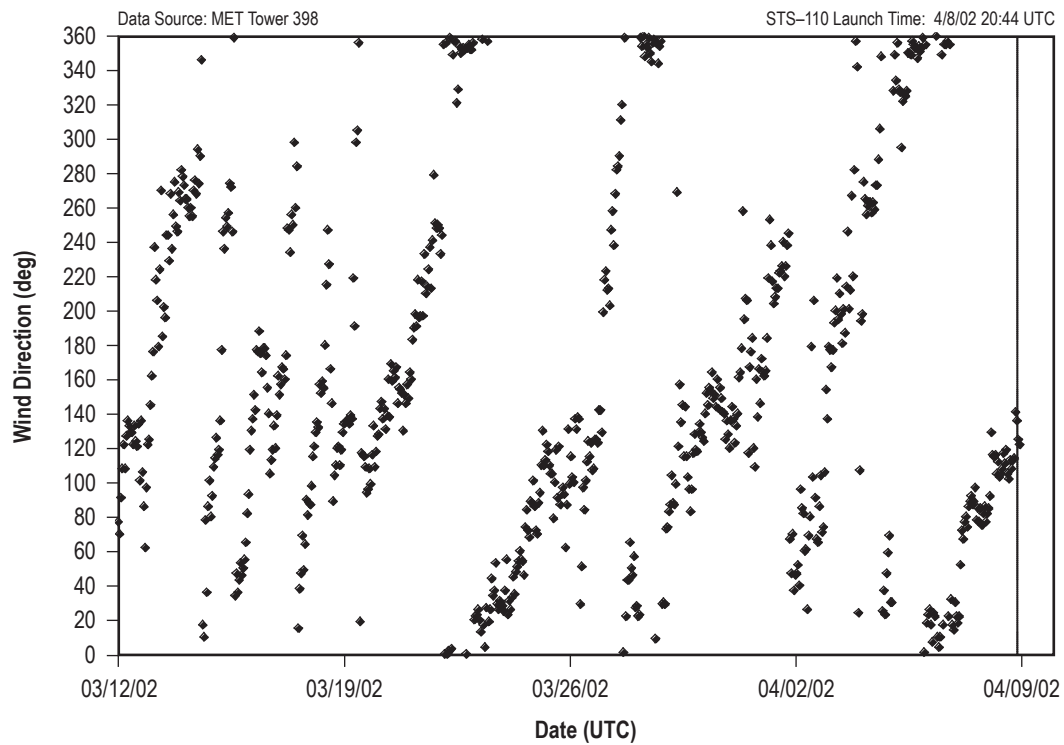


Figure 658. STS-110 hourly surface wind direction.

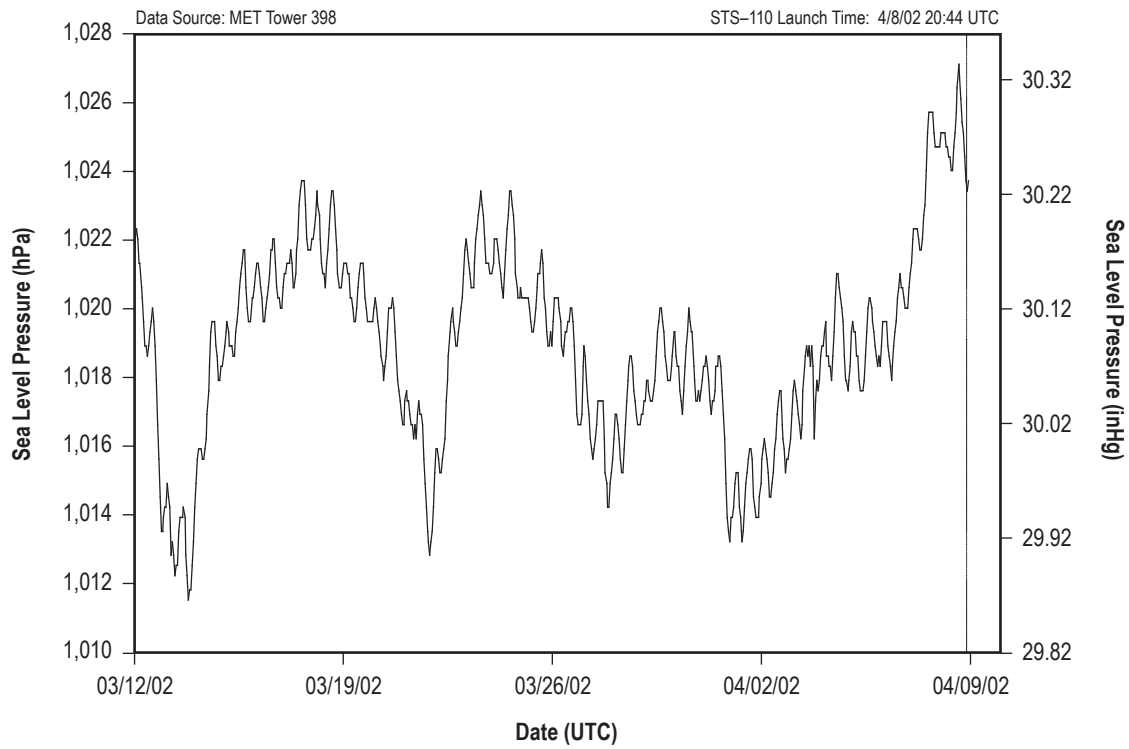


Figure 659. STS-110 hourly sea level pressure.

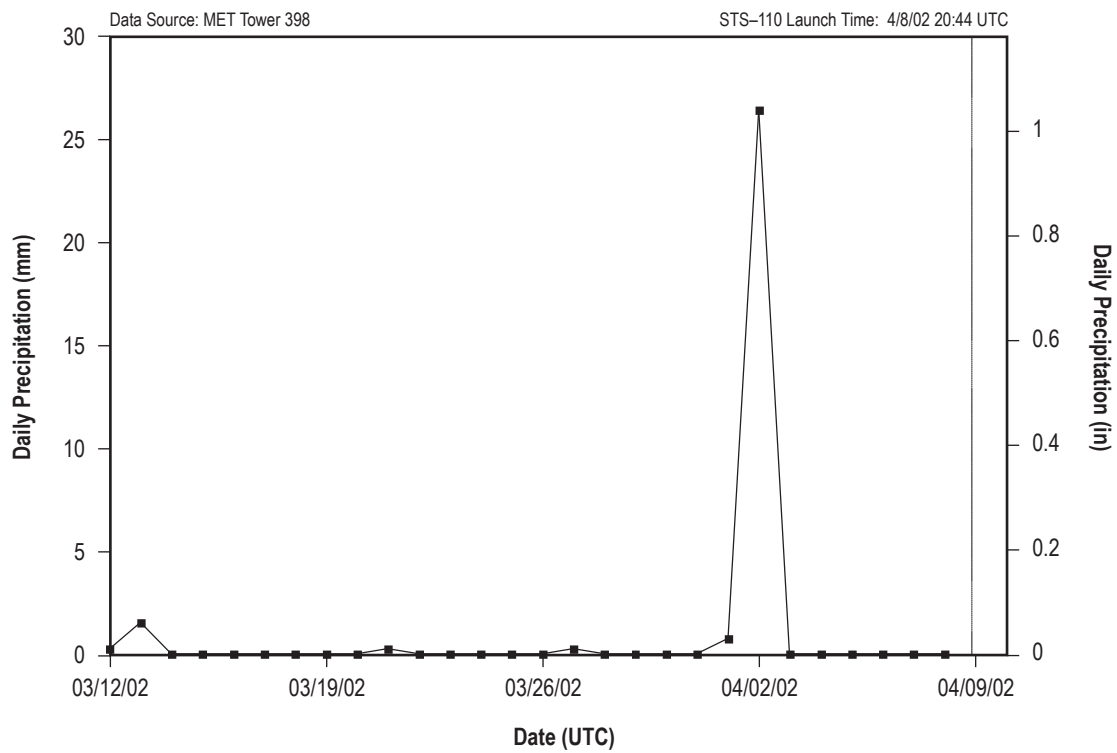


Figure 660. STS-110 daily precipitation totals.

## 5.110 STS–111

STS–111 was the 18th mission for *Endeavour* (OV–105). It rolled out to pad 39A on April 29, 2002. STS–111 was exposed on the pad for 38 days and launched on June 5, 2002, at 21:23 UTC.

### 5.110.1 STS–111 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–111 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.110.2 STS–111 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–111 are shown in table 223. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 223. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 223. STS–111 L–0 surface observations.

Temperature	28.9 °C (84 °F)
Relative humidity	73%
Sea level pressure	1,015.2 hPa (29.98 inHg)
Wind speed	4.9 m/s (9.5 kt) (1-min average)
Wind direction	105° (1-min average)
Sky condition	2/8 towering cumulus at 823 m (2,700 ft); 3/8 cirrostratus at 6,401 m (21,000 ft); 2/8 cirrostratus at 7,315 m (24,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.110.3 STS–111 Pad Exposure Period Hourly Meteorological Parameters

Figures 661–666 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–111 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 224. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 224. STS–111 pad exposure period hourly extremes.

Minimum temperature	20 °C (68 °F)
Maximum temperature	32.2 °C (90 °F)
Minimum relative humidity	44%
Maximum relative humidity	100%
Minimum sea level pressure	1,008.4 hPa (29.78 inHg)
Maximum sea level pressure	1,025.7 hPa (30.29 inHg)
Maximum wind speed and associated wind direction	17.5 m/s (34 kt) 1°
Total precipitation	31.8 mm (1.25 in)

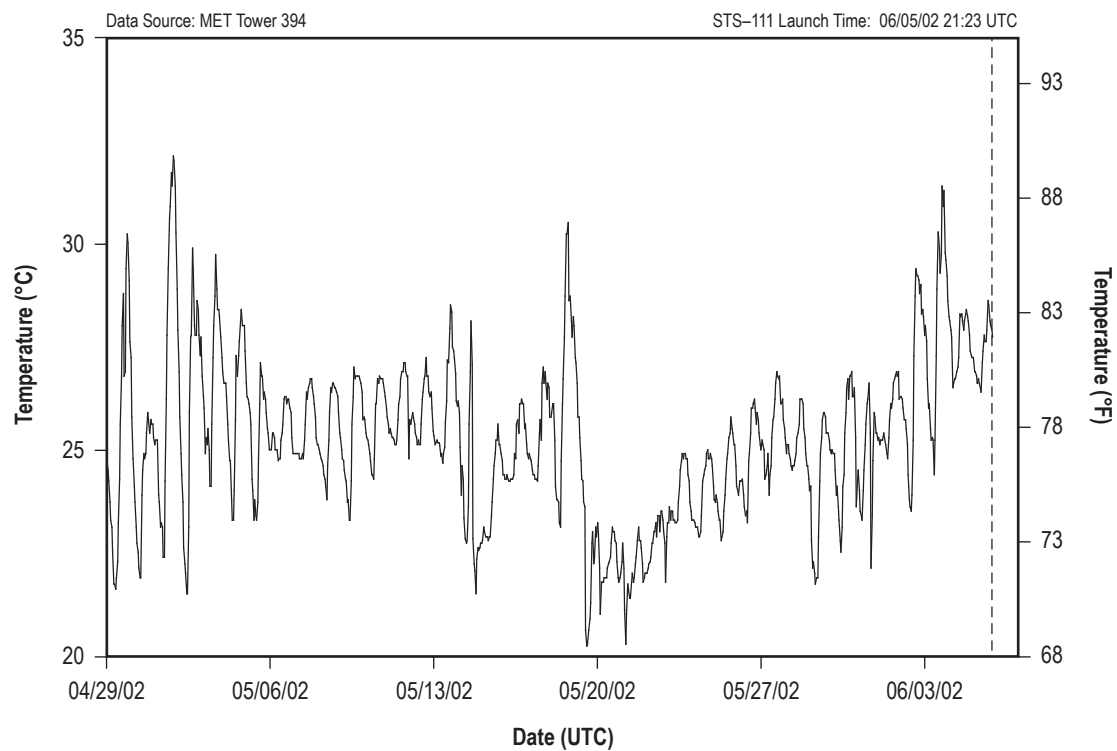


Figure 661. STS-111 hourly surface temperature.

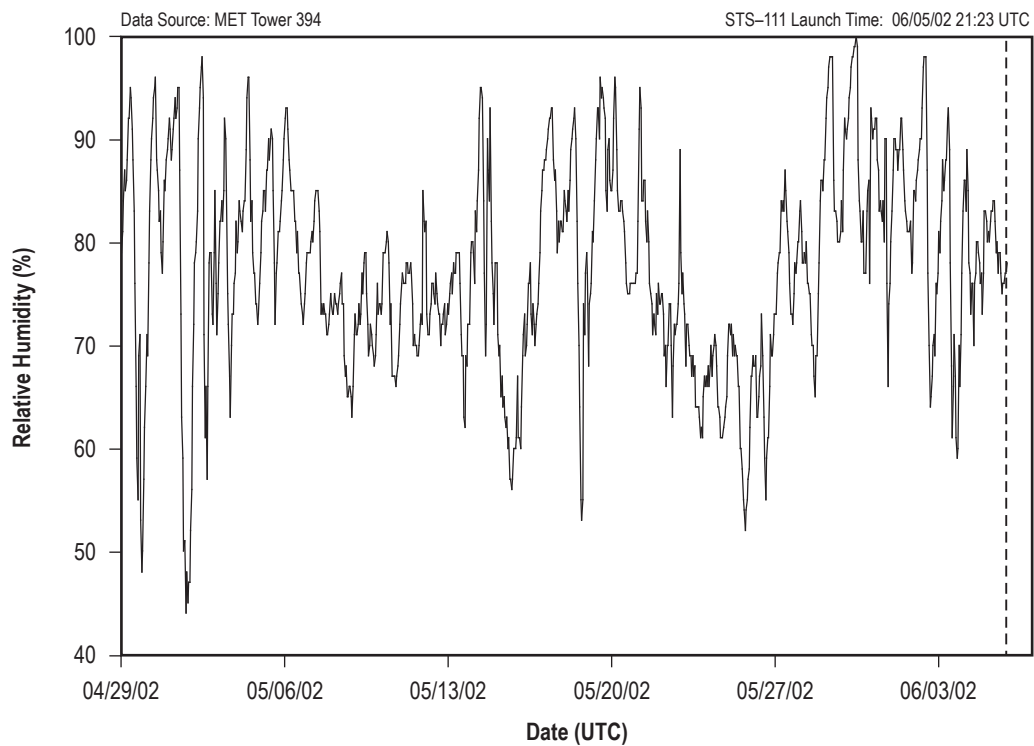


Figure 662. STS-111 hourly surface relative humidity.

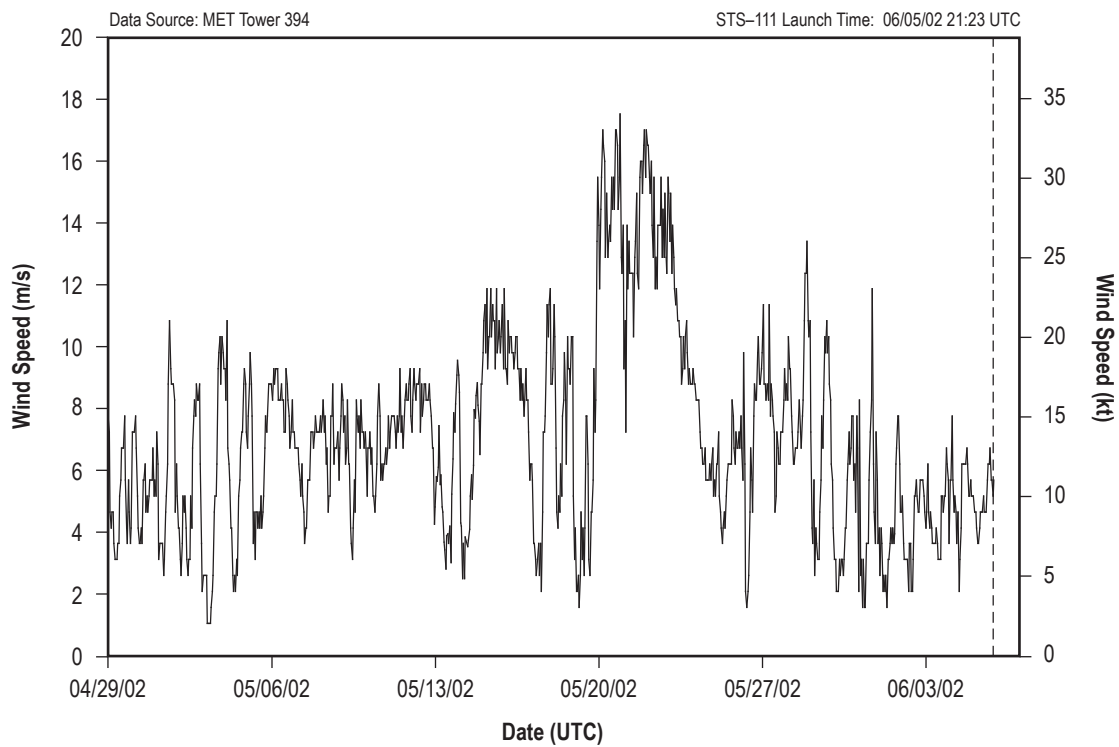


Figure 663. STS-111 hourly surface wind speed.

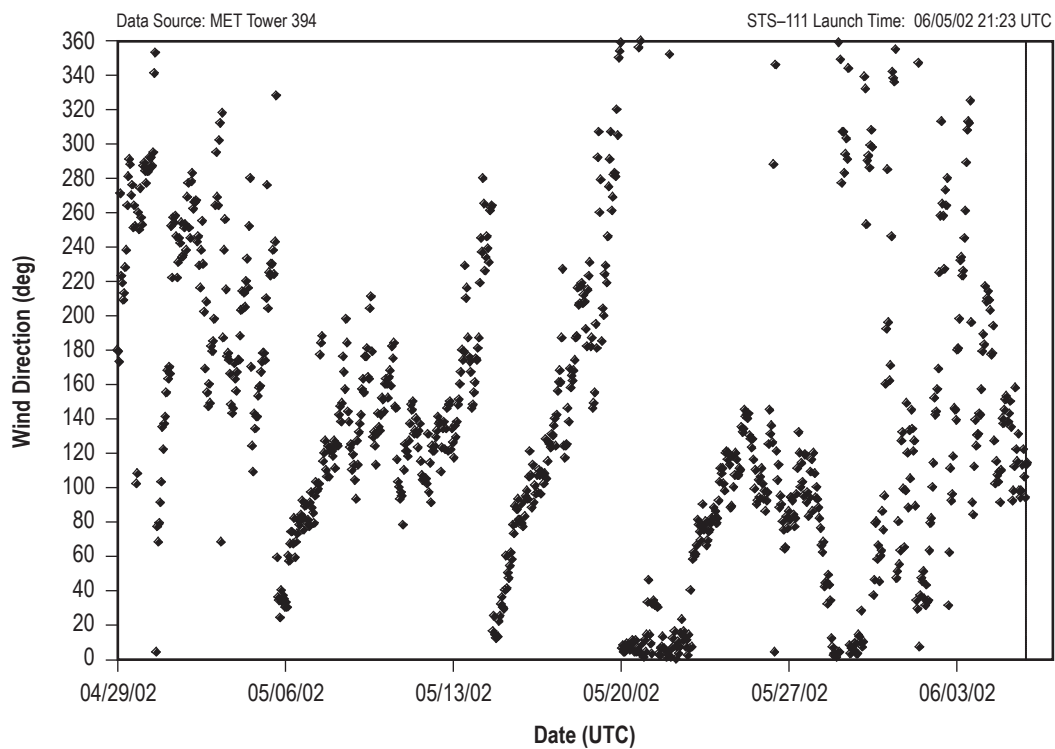


Figure 664. STS-111 hourly surface wind direction.



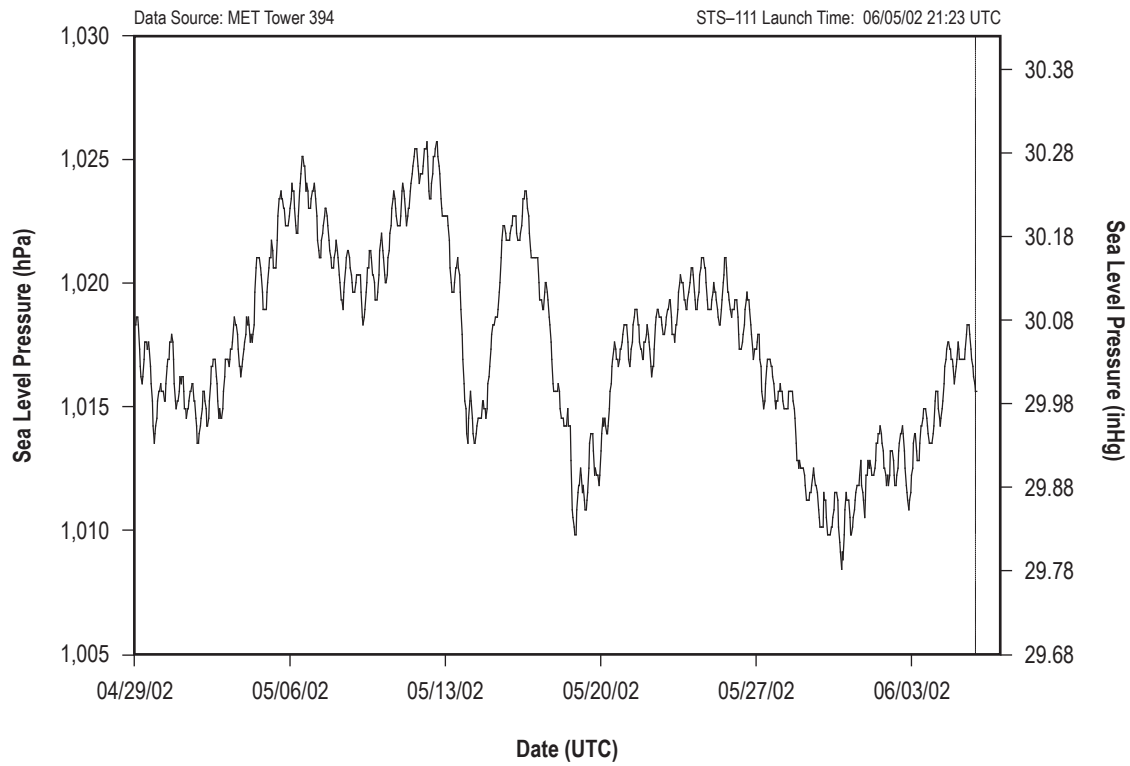


Figure 665. STS-111 hourly sea level pressure.

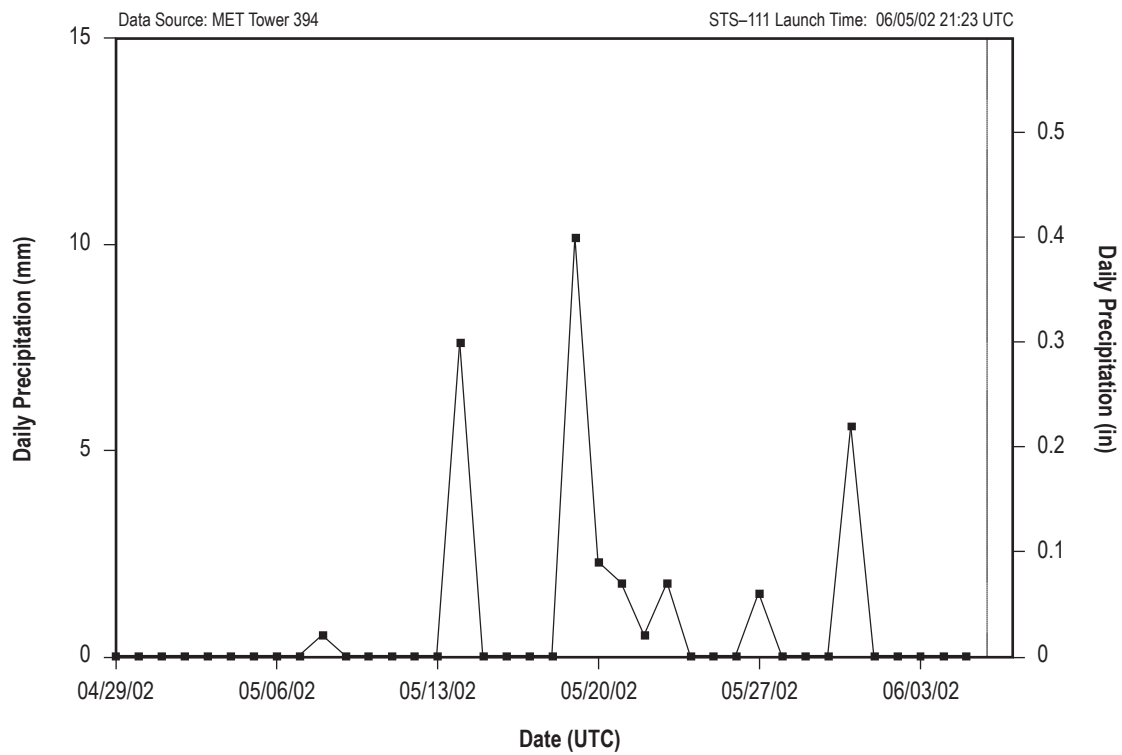


Figure 666. STS-111 daily precipitation totals.

## 5.111 STS–112

STS–112 was the 26th mission for *Atlantis* (OV–104). It rolled out to pad 39B on September 10, 2002. STS–112 was exposed on the pad for 28 days and launched on October 7, 2002, at 19:46 UTC.

### 5.111.1 STS–112 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–112 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.111.2 STS–112 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–112 are shown in table 225. Temperature, relative humidity, and pressure measurements were taken at pad 39B, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 225. Wind speed and wind direction were obtained from pad 39B, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 225. STS–112 L–0 surface observations.

Temperature	28.3 °C (83 °F)
Relative humidity	69%
Sea level pressure	1,013.5 hPa (29.93 inHg)
Wind speed	6.4 m/s (12.4 kt) (1-min average)
Wind direction	20° (1-min average)
Sky condition	2/8 cumulus at 610 m (2,000 ft); 1/8 cirrus at 9,144 m (30,000 ft)
Visibility	14.5 km (7.8 nmi)

### 5.111.3 STS–112 Pad Exposure Period Hourly Meteorological Parameters

Figures 667–672 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–112 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 226. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 398 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 398.

Table 226. STS–112 pad exposure period hourly extremes.

Minimum temperature	23.3 °C (74 °F)
Maximum temperature	31.7 °C (89 °F)
Minimum relative humidity	50%
Maximum relative humidity	100%
Minimum sea level pressure	1,009.1 hPa (29.8 inHg)
Maximum sea level pressure	1,021 hPa (30.15 inHg)
Maximum wind speed and associated wind direction	14.9 m/s (29 kt) 160°
Total precipitation	14.7 mm (0.58 in)

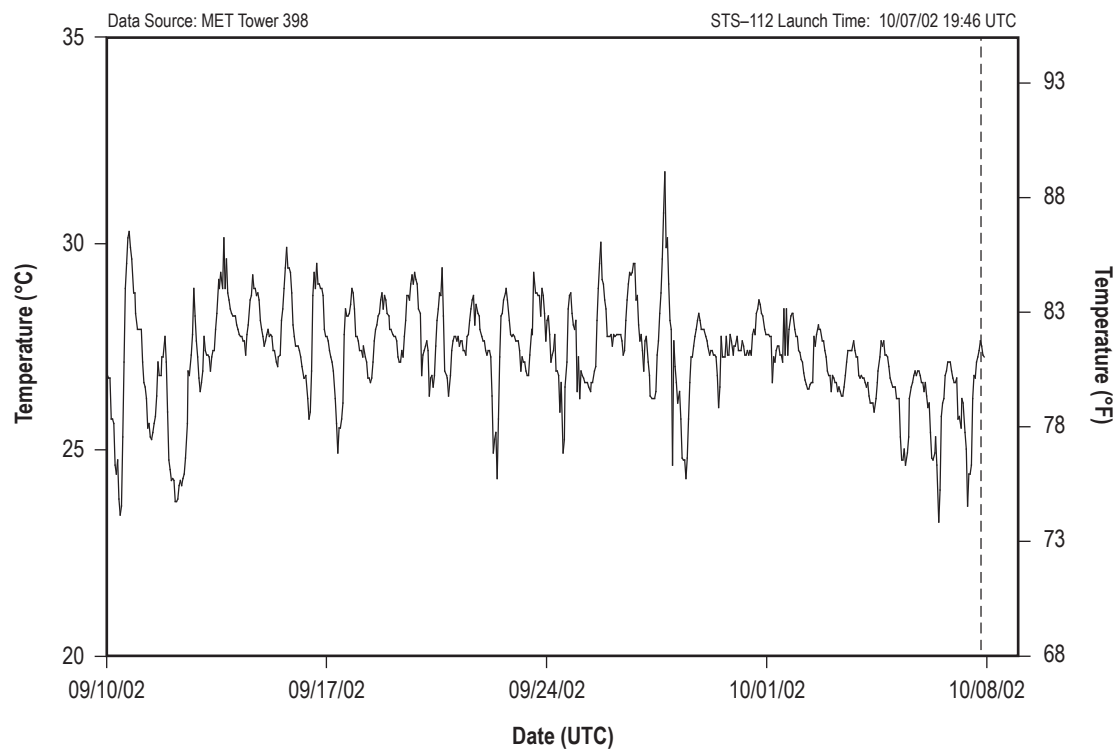


Figure 667. STS-112 hourly surface temperature.

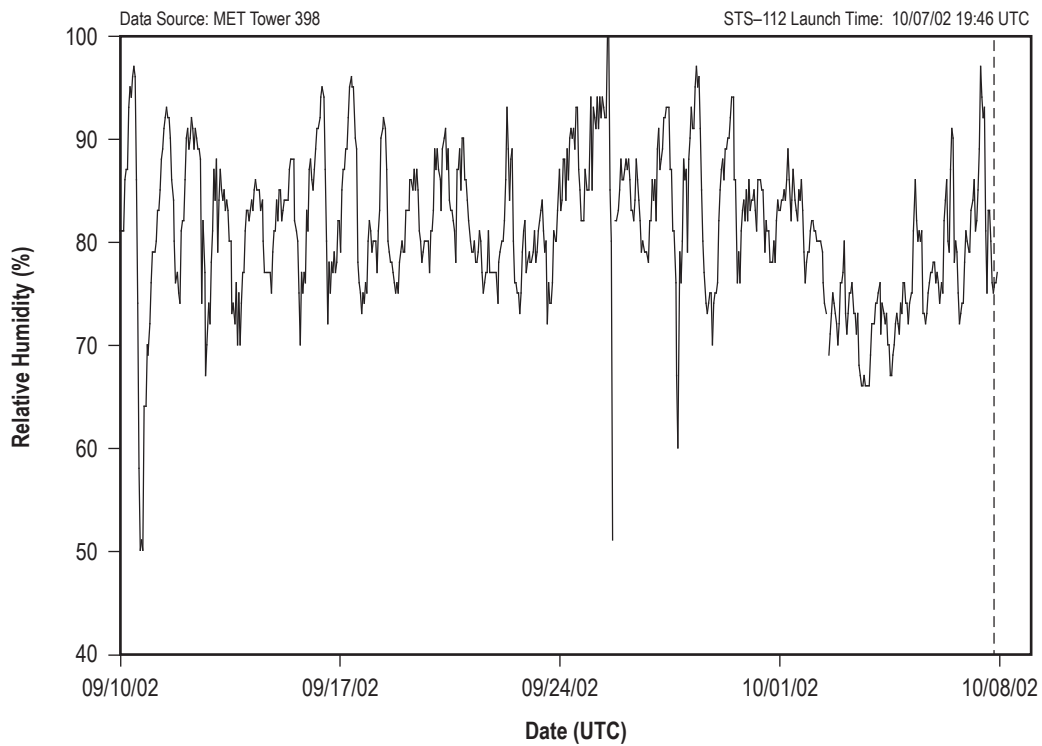


Figure 668. STS-112 hourly surface relative humidity.

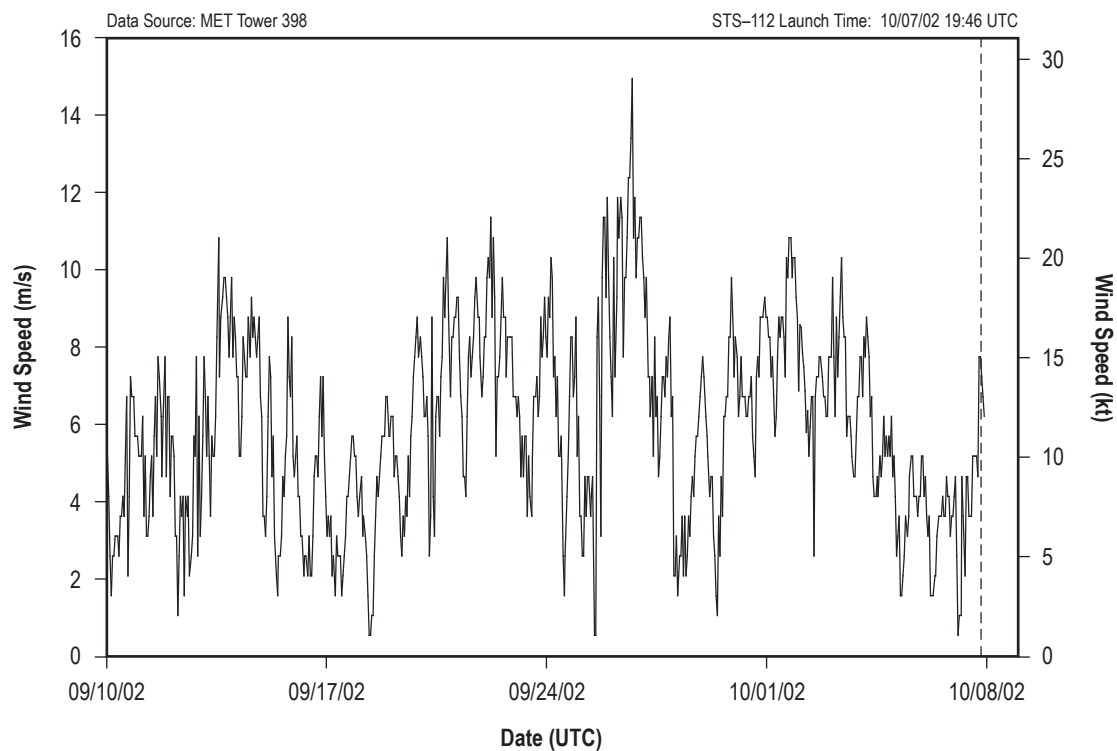


Figure 669. STS-112 hourly surface wind speed.

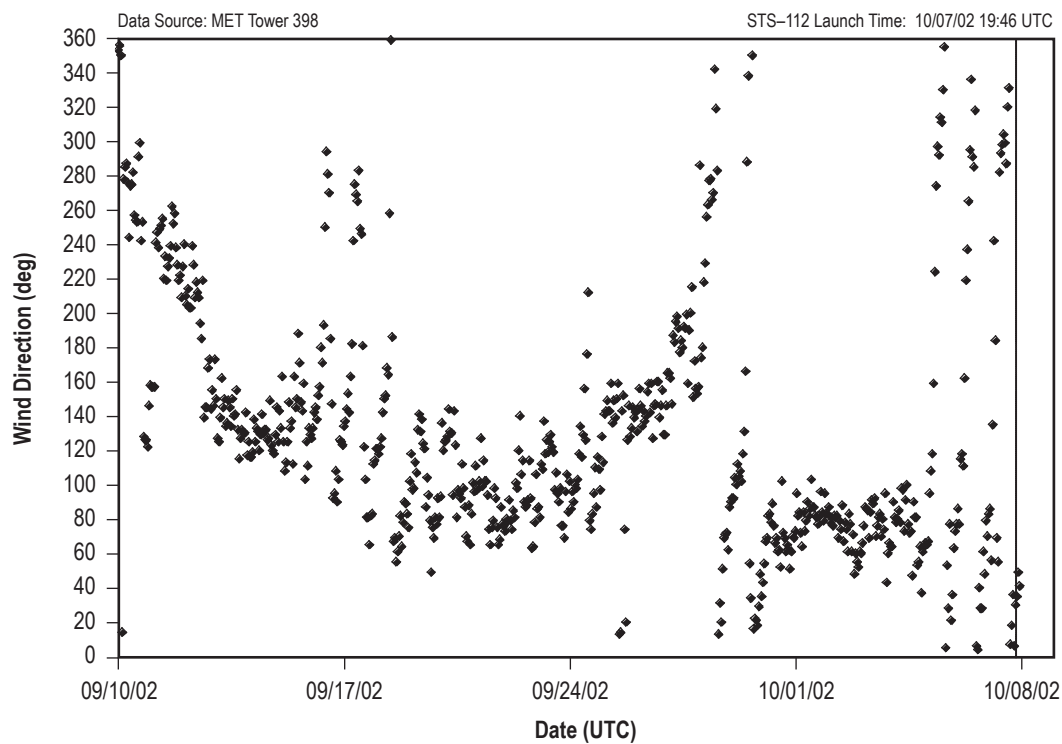


Figure 670. STS-112 hourly surface wind direction.

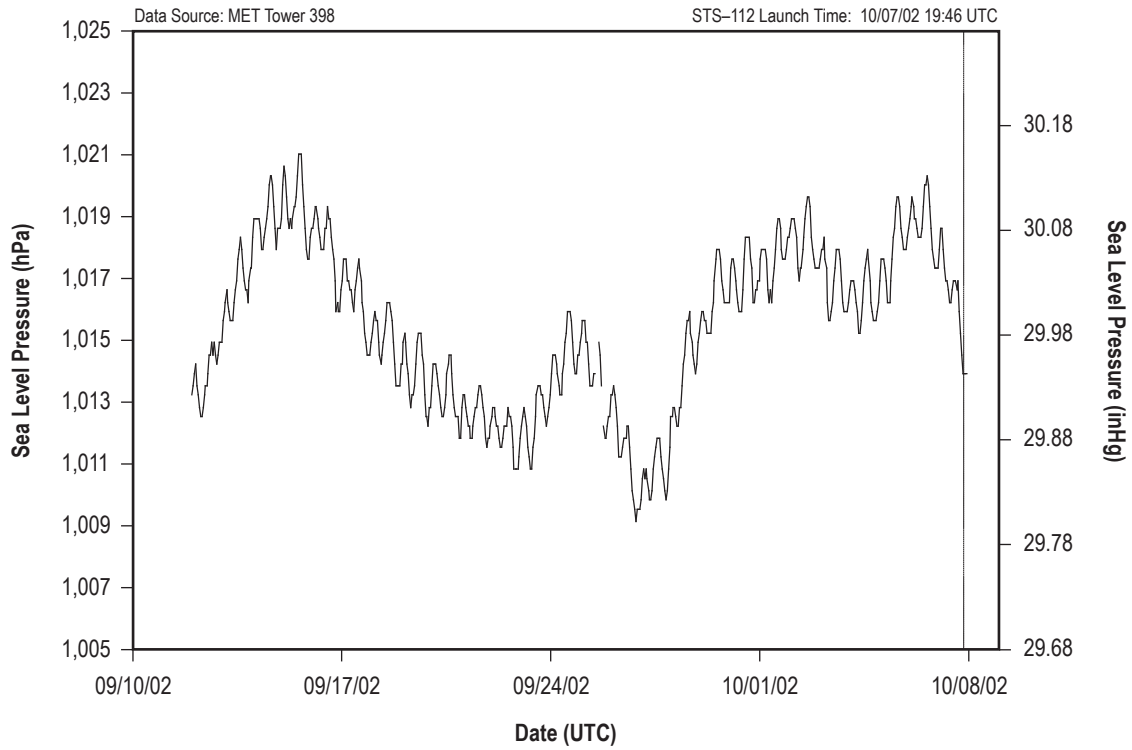


Figure 671. STS-112 hourly sea level pressure.

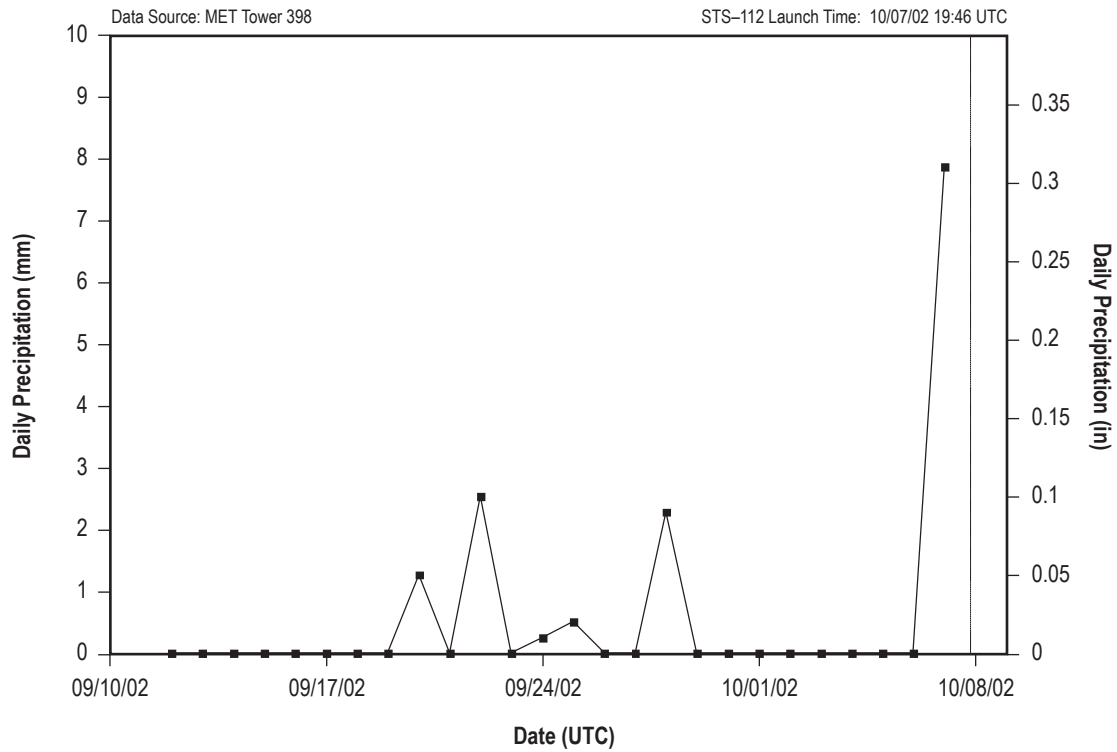


Figure 672. STS-112 daily precipitation totals.

## 5.112 STS–113

STS–113 was the 19th mission for *Endeavour* (OV–105). It rolled out to pad 39A on October 12, 2002. STS–113 was exposed on the pad for 43 days and launched on November 24, 2002, at 00:50 UTC.

### 5.112.1 STS–113 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–113 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

### 5.112.2 STS–113 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–113 are shown in table 227. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 227. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 227. STS–113 L–0 surface observations.

Temperature	13.9 °C (57 °F)
Relative humidity	75%
Sea level pressure	1,024 hPa (30.24 inHg)
Wind speed	2.7 m/s (5.3 kt) (1-min average)
Wind direction	4° (1-min average)
Sky condition	1/8 stratocumulus at 1,219 m (4,000 ft)
Visibility	16.1 km (8.7 nmi)

### 5.112.3 STS–113 Pad Exposure Period Hourly Meteorological Parameters

Figures 673–678 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–113 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 228. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 228. STS–113 pad exposure period hourly extremes.

Minimum temperature	6.7 °C (44 °F)
Maximum temperature	30 °C (86 °F)
Minimum relative humidity	35%
Maximum relative humidity	100%
Minimum sea level pressure	1,004.7 hPa (29.67 inHg)
Maximum sea level pressure	1,028.4 hPa (30.37 inHg)
Maximum wind speed and associated wind direction	17.5 m/s (34 kt) 269°
Total precipitation	58.7 mm (2.31 in)

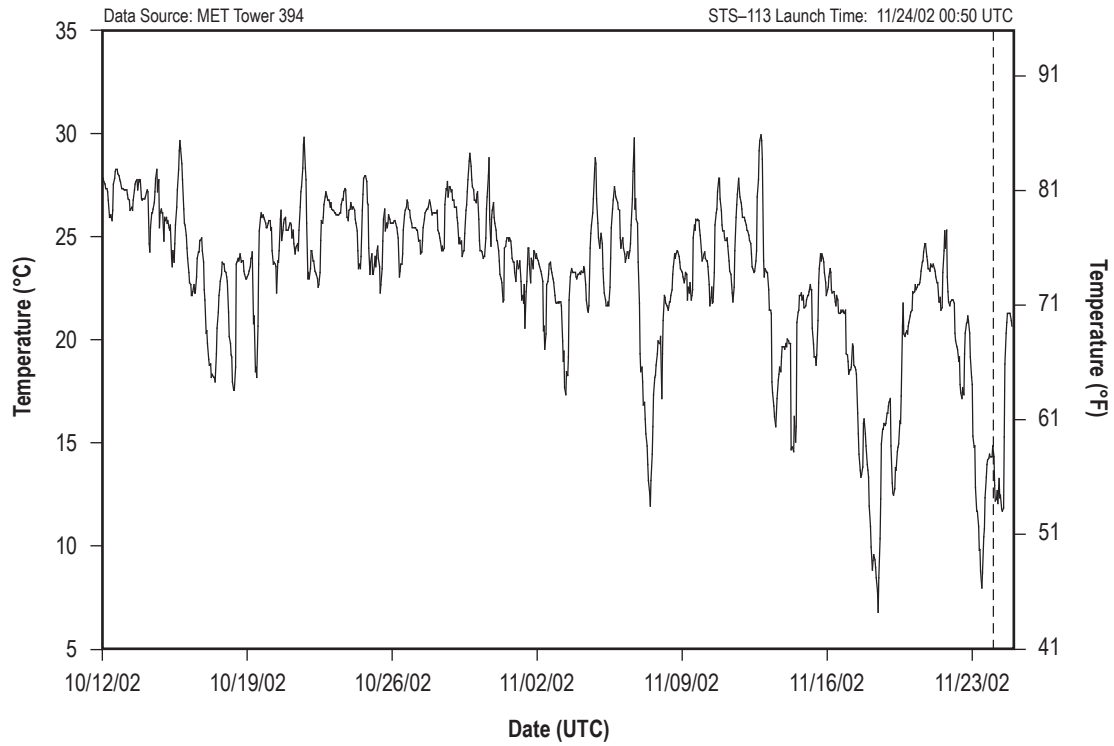


Figure 673. STS-113 hourly surface temperature.

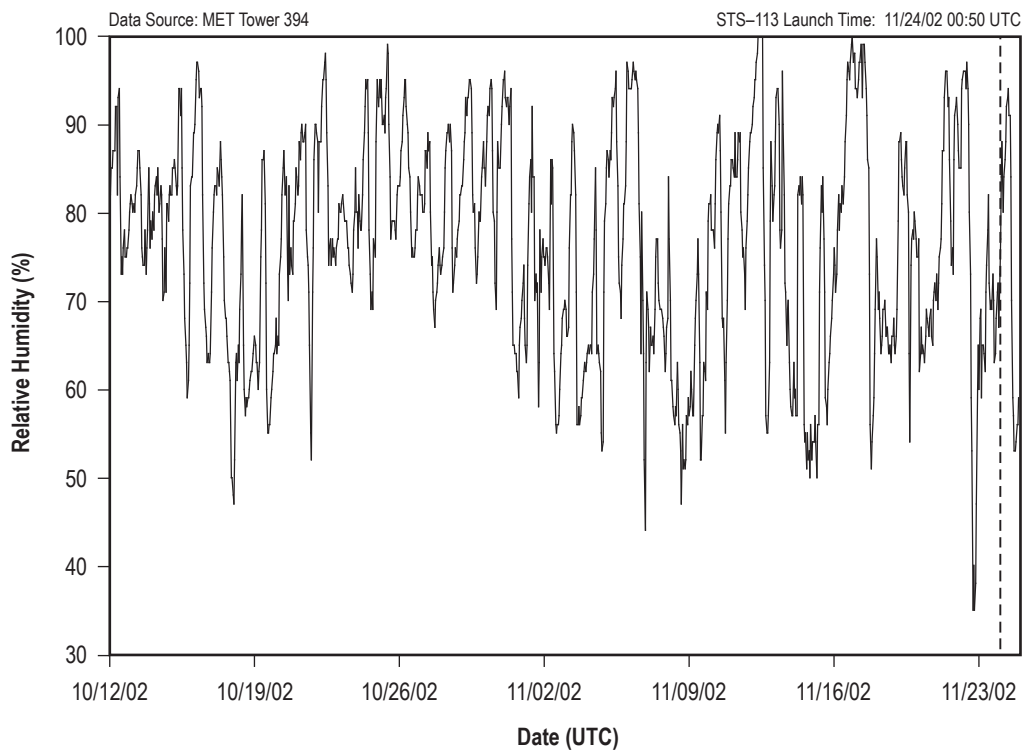


Figure 674. STS-113 hourly surface relative humidity.

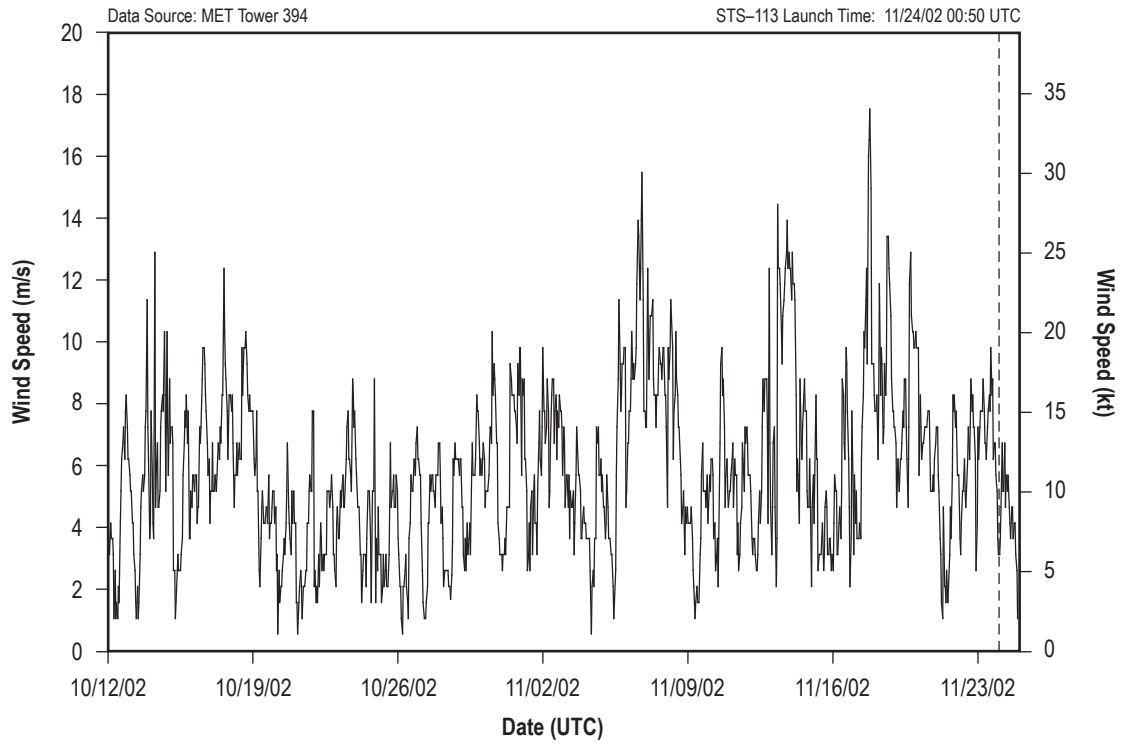


Figure 675. STS-113 hourly surface wind speed.

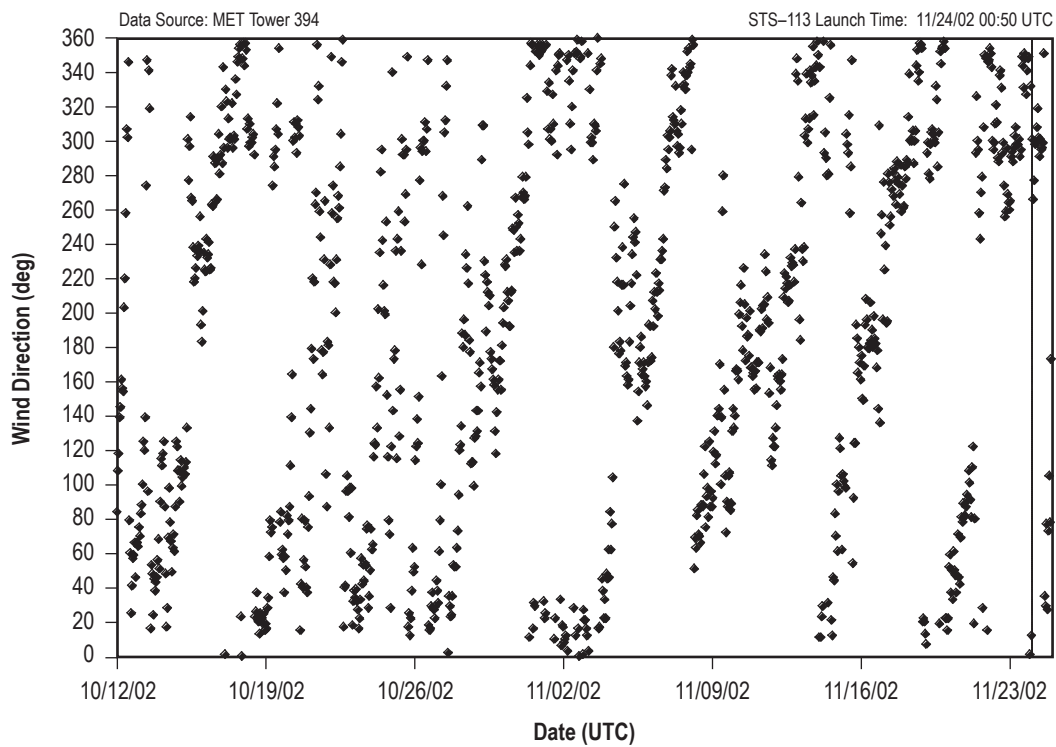


Figure 676. STS-113 hourly surface wind direction.



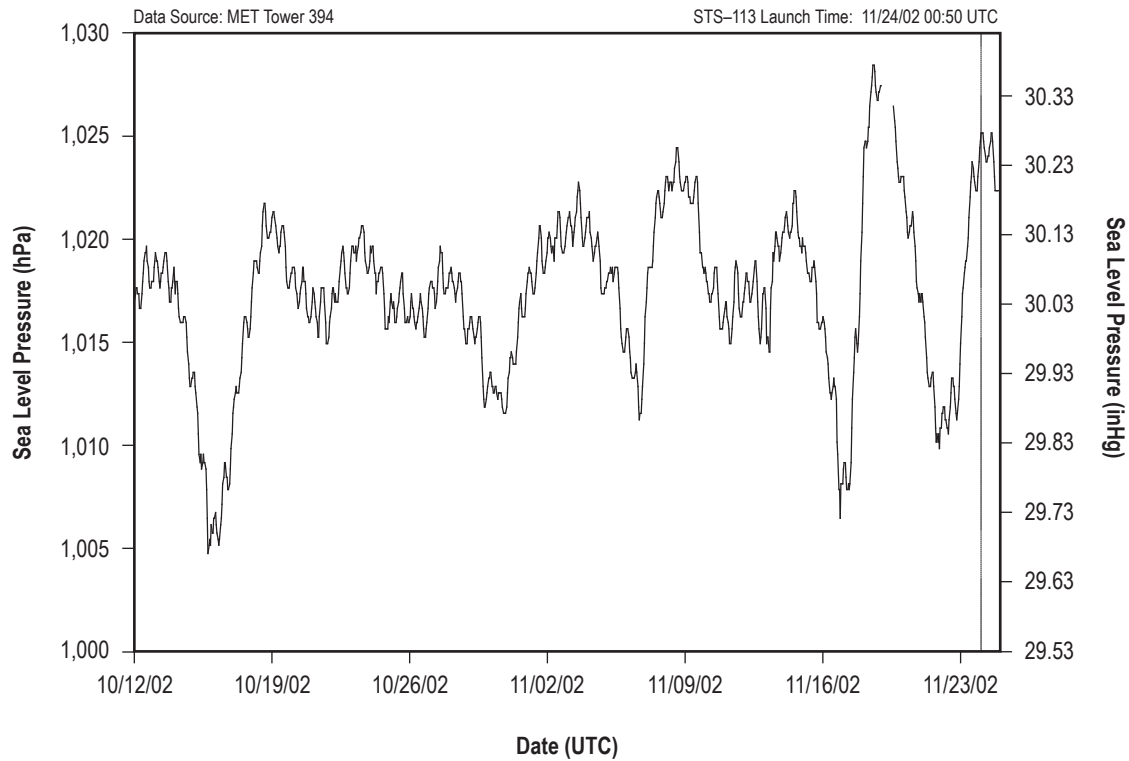


Figure 677. STS-113 hourly sea level pressure.

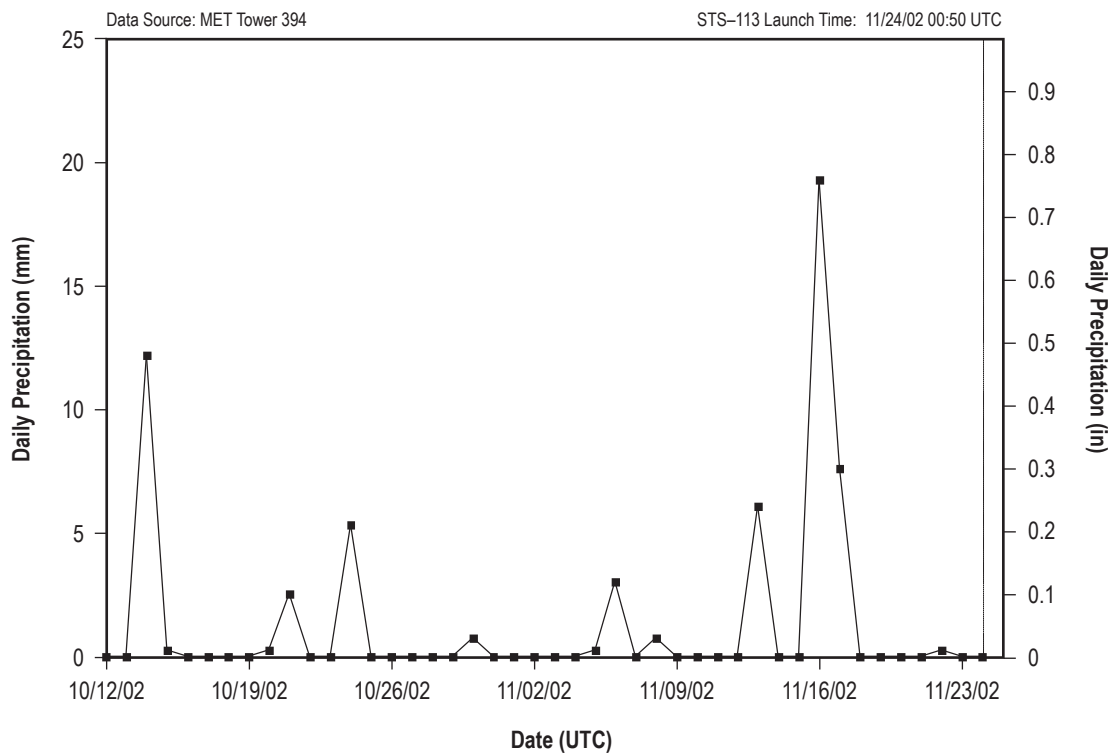


Figure 678. STS-113 daily precipitation totals.

### 5.113 STS–107

STS–107 was the 28th mission for *Columbia* (OV–102). It rolled out to pad 39A on December 9, 2002. STS–113 was exposed on the pad for 39 days and launched on January 16, 2003, at 15:39 UTC.

#### 5.113.1 STS–107 Pad Exposure Period Data Archive Sources

Temperature, dewpoint, relative humidity, wind speed, and wind direction data from MET towers 393, 394, 397, and 398 at the 18-m (60-ft) level and from MET towers 3131 and 3132 at the 16-m (54-ft) level have been archived for the STS–107 exposure period. Precipitation data from MET towers 393, 394, 397, and 398 and pressure data from MET towers 394 and 398 have also been archived. Surface observations from station 74794 were also archived for this mission.

#### 5.113.2 STS–107 L–0 Surface Observations

The surface meteorological parameters observed at L–0 for STS–107 are shown in table 229. Temperature, relative humidity, and pressure measurements were taken at pad 39A, camera site 3 at 6.4 m (21 ft) above MSL. Pressure has been adjusted to sea level in table 229. Wind speed and wind direction were obtained from pad 39A, camera site 3 at 18.3 m (60 ft) ANG. Sky condition and visibility were observed at the NASA Shuttle landing facility.

Table 229. STS–107 L–0 surface observations.

Temperature	18.3 °C (65 °F)
Relative humidity	68%
Sea level pressure	1,024 hPa (30.24 inHg)
Wind speed	0.8 m/s (1.5 kt) (1-min average)
Wind direction	173° (1-min average)
Sky condition	3/8 stratocumulus at 1,067 m (3,500 ft)
Visibility	16.1 km (8.7 nmi)

#### 5.113.3 STS–107 Pad Exposure Period Hourly Meteorological Parameters

Figures 679–684 show the hourly temperature, relative humidity, wind speed, wind direction, sea level pressure, and daily precipitation totals for the STS–107 pad exposure period. The hourly extremes of these parameters and total precipitation are shown in table 230. Temperature, relative humidity, wind speed, and wind direction data in this section are from MET tower 394 (the closest available source to the pad for this mission) at the 18-m (60-ft) level. Sea level pressure and precipitation are also from MET tower 394.

Table 230. STS–107 pad exposure period hourly extremes.

Minimum temperature	3.9 °C (39 °F)
Maximum temperature	25 °C (77 °F)
Minimum relative humidity	39%
Maximum relative humidity	100%
Minimum sea level pressure	1,007.4 hPa (29.75 inHg)
Maximum sea level pressure	1,029.1 hPa (30.39 inHg)
Maximum wind speed and associated wind direction	17.5 m/s (34 kt) 352°
Total precipitation	314.4 mm (12.38 in)

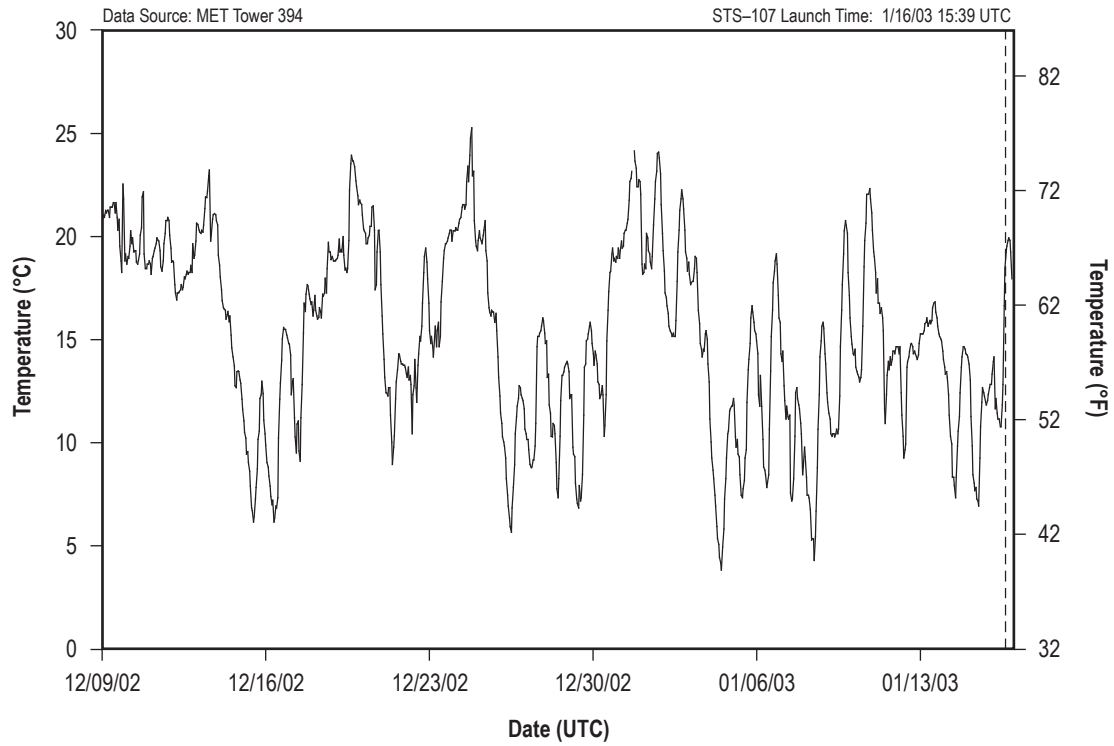


Figure 679. STS-107 hourly surface temperature.

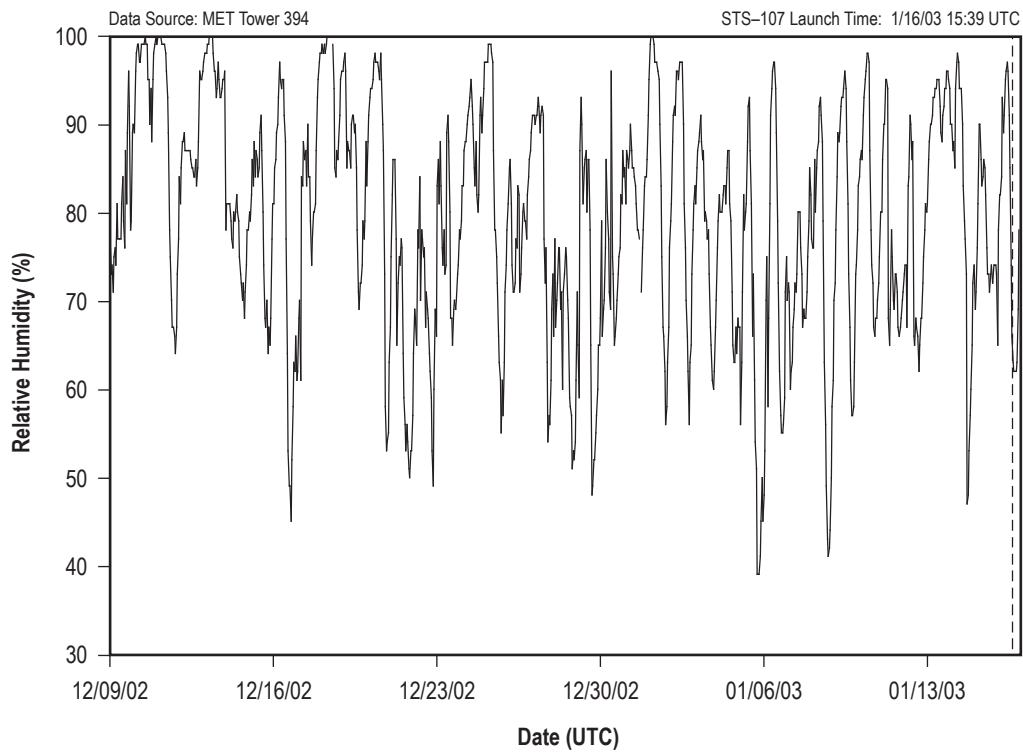


Figure 680. STS-107 hourly surface relative humidity.

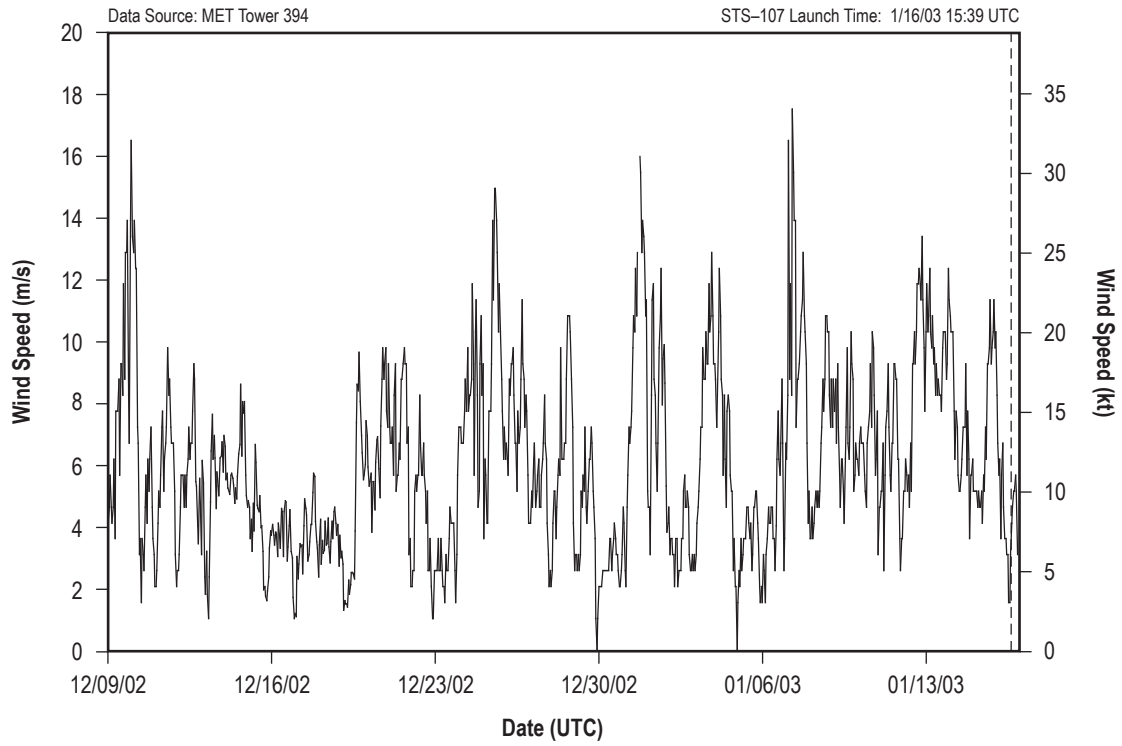


Figure 681. STS-107 hourly surface wind speed.

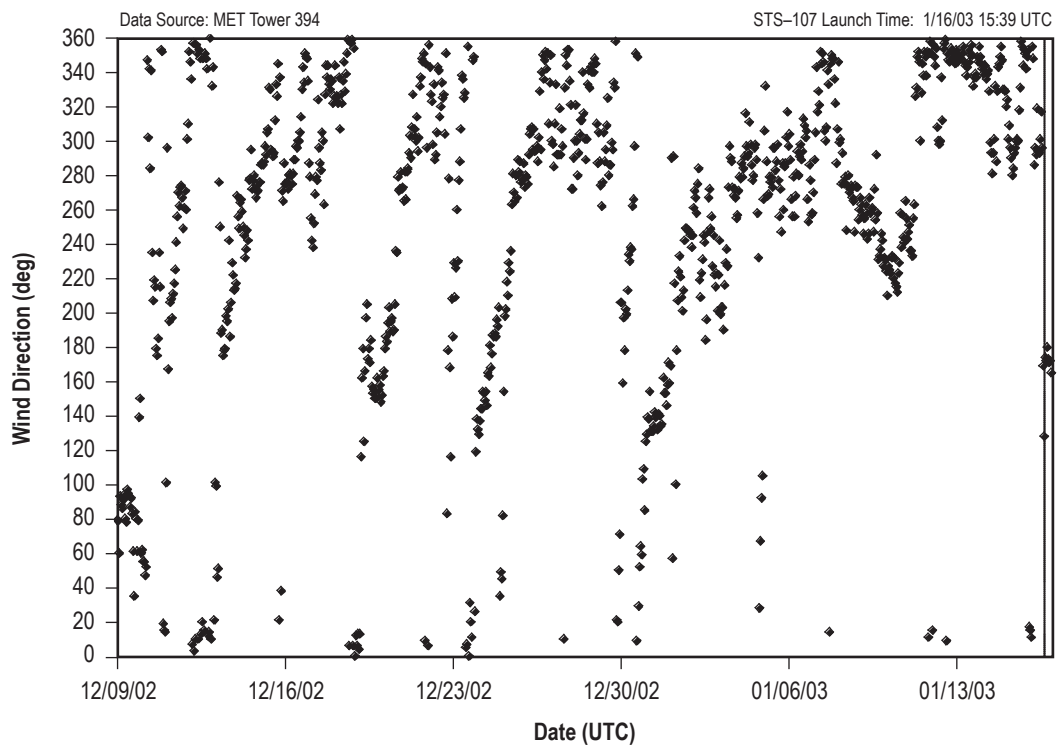


Figure 682. STS-107 hourly surface wind direction.

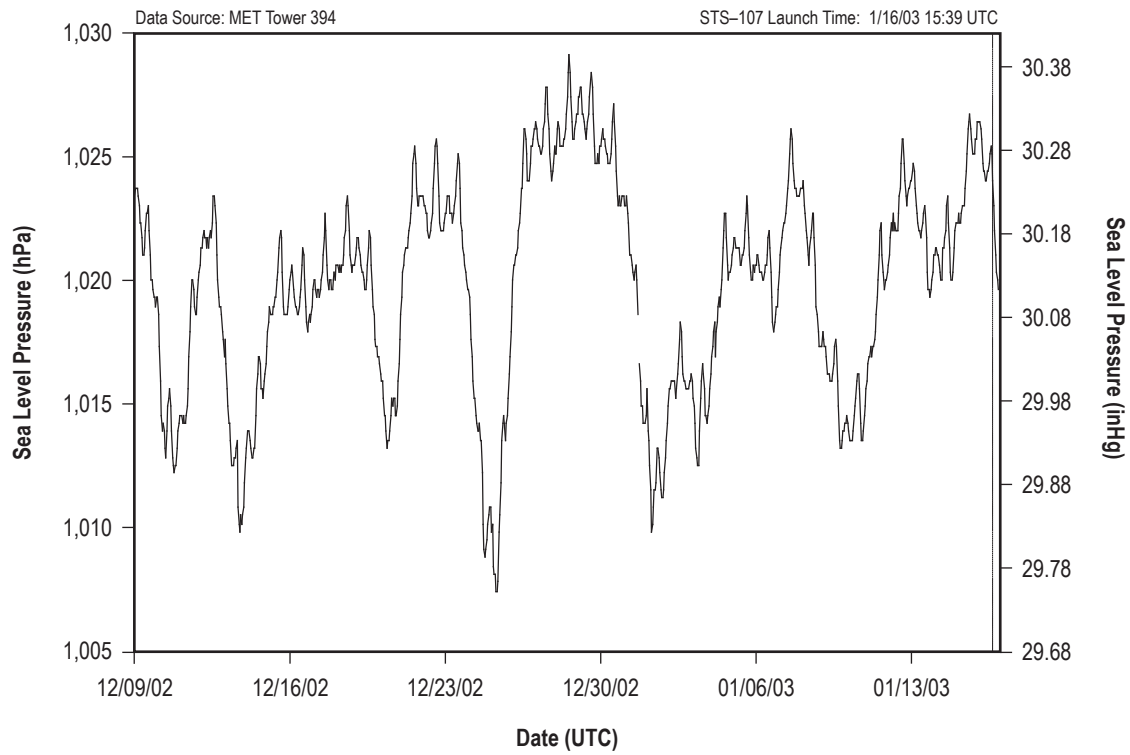


Figure 683. STS-107 hourly sea level pressure.

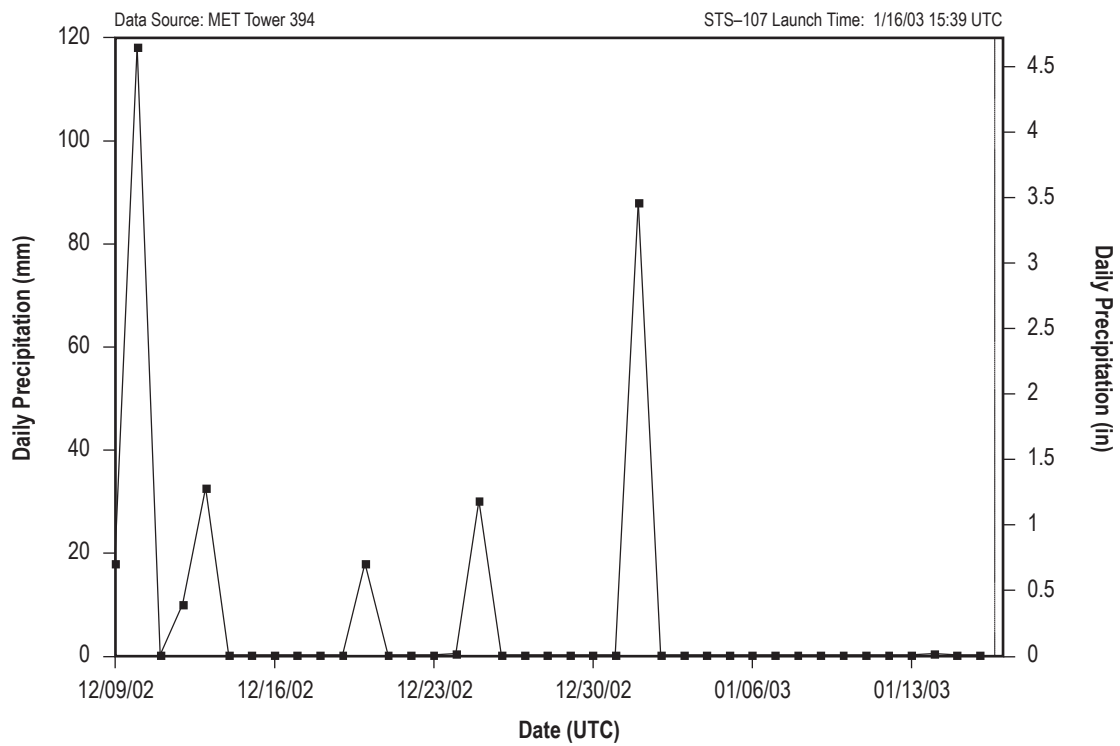


Figure 684. STS-107 daily precipitation totals.



## 6. SUMMARY OF L-0 SURFACE OBSERVATIONS

Table 231 contains the L-0 surface observations for all missions. It compiles the L-0 data from section 5 into a single table with the exception of the sky condition and visibility data.

Table 231. L-0 surface observations summary.

Mission	Launch Date	Time (UTC)	Temperature (°C)	Relative Humidity (%)	Sea Level Pressure (hPa)	Wind Speed (m/s)	Wind Direction (deg)
STS-1	1981.04.12	12:00	21.1	82	1,023.7	3.6	125
STS-2	1981.11.12	15:10	22.8	61	1,016.9	8.2	345
STS-3	1982.03.22	16:00	24.4	71	1,016.6	2.1	50
STS-4	1982.06.27	15:00	29.1	70	1,020.7	1.8	133
STS-5	1982.11.11	12:19	22.0	59	1,023.3	6.7	90
STS-6	1983.04.04	18:30	22.8	55	1,019.0	3.9	63
STS-7	1983.06.18	11:33	25.1	80	1,015.2	1.8	10
STS-8	1983.08.30	06:32	23.9	97	1,011.9	2.7	269
STS-9	1983.11.28	16:00	24.4	83	1,015.9	5.8	183
41-B	1984.02.03	13:00	16.7	75	1,018.0	0.0	0
41-C	1984.04.06	13:58	15.8	56	1,015.6	6.5	320
41-D	1984.08.30	12:42	26.2	81	1,018.0	0.9	106
41-G	1984.10.05	11:03	23.3	60	1,021.7	5.0	73
51-A	1984.11.08	12:15	19.9	64	1,023.4	7.0	24
51-C	1985.01.24	19:50	17.7	46	1,018.0	5.2	228
51-D	1985.04.12	13:59	20.7	55	1,026.4	6.1	82
51-B	1985.04.29	16:02	27.4	65	1,013.5	3.5	5
51-G	1985.06.17	11:33	22.8	91	1,020.7	0.9	201
51-F	1985.07.29	21:00	28.3	72	1,018.0	4.5	101
51-I	1985.08.27	10:58	24.3	86	1,023.0	4.3	73
51-J	1985.10.03	15:15	28.2	79	1,019.3	5.2	213
61-A	1985.10.30	17:00	27.8	72	1,006.4	3.9	217
61-B	1985.11.27	00:29	22.7	81	1,020.9	3.1	165
61-C	1986.01.12	11:55	12.0	84	1,021.3	4.7	323
51-L	1986.01.28	16:38	2.6	27	1,026.1	6.1	331
STS-26	1988.09.29	15:37	28.9	56	1,019.0	4.2	58
STS-27	1988.12.02	14:31	13.9	50	1,027.8	7.8	314
STS-29	1989.03.13	14:57	17.8	78	1,019.3	5.2	242
STS-30	1989.05.04	18:47	26.1	57	1,020.0	6.6	106
STS-28	1989.08.08	12:37	26.7	80	1,011.9	3.8	252
STS-34	1989.10.18	16:54	30.0	52	1,015.2	4.1	193
STS-33	1989.11.23	00:23	18.9	80	1,013.2	5.2	208
STS-32	1990.01.09	12:35	12.2	100	1,020.7	2.1	246
STS-36	1990.02.28	07:50	18.3	71	1,026.8	7.2	72
STS-31	1990.04.24	12:34	22.2	63	1,020.0	5.7	80
STS-41	1990.10.06	11:47	27.2	73	1,018.3	7.2	90

Table 231. L-0 surface observations summary.

<b>Mission</b>	<b>Launch Date</b>	<b>Time (UTC)</b>	<b>Temperature (°C)</b>	<b>Relative Humidity (%)</b>	<b>Sea Level Pressure (hPa)</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction (deg)</b>
STS-38	1990.11.15	23:48	21.1	63	1,025.7	8.8	84
STS-35	1990.12.02	06:49	21.7	61	1,024.0	6.6	88
STS-37	1991.04.05	14:23	22.8	84	1,025.6	5.7	74
STS-39	1991.04.28	11:33	22.2	95	1,014.9	3.9	191
STS-40	1991.06.05	13:25	23.9	83	1,020.0	2.1	234
STS-43	1991.08.02	15:02	27.8	73	1,018.6	5.2	170
STS-48	1991.09.12	23:11	25.0	71	1,014.6	3.8	74
STS-44	1991.11.24	23:44	12.2	48	1,019.6	2.6	301
STS-42	1992.01.22	14:53	17.2	86	1,022.0	3.1	38
STS-45	1992.03.24	13:13	18.9	72	1,018.0	7.2	359
STS-49	1992.05.07	23:40	17.2	70	1,013.5	4.1	322
STS-50	1992.06.25	16:12	28.3	72	1,013.2	6.9	151
STS-46	1992.07.31	13:57	28.9	76	1,020.3	3.2	310
STS-47	1992.09.12	14:23	27.8	70	1,020.1	5.0	44
STS-52	1992.10.22	17:10	25.0	49	1,027.7	8.4	48
STS-53	1992.12.02	13:24	11.1	87	1,020.0	3.1	215
STS-54	1993.01.13	13:59	21.1	94	1,022.0	2.9	180
STS-56	1993.04.08	05:29	18.3	74	1,017.3	5.1	65
STS-55	1993.04.26	14:50	25.0	70	1,019.2	6.2	173
STS-57	1993.06.21	13:07	28.3	65	1,019.1	3.1	91
STS-51	1993.09.12	11:45	22.8	98	1,020.0	2.0	294
STS-58	1993.10.18	14:53	25.6	72	1,017.3	3.2	316
STS-61	1993.12.02	09:26	18.9	84	1,024.4	1.8	70
STS-60	1994.02.03	12:10	7.2	82	1,027.8	4.2	318
STS-62	1994.03.04	13:53	11.7	57	1,018.3	5.0	285
STS-59	1994.04.09	11:05	22.0	81	1,024.0	9.8	100
STS-65	1994.07.08	16:43	30.1	72	1,023.4	4.7	100
STS-64	1994.09.09	22:23	28.9	75	1,016.9	3.8	111
STS-68	1994.09.30	11:16	25.8	75	1,016.7	5.2	70
STS-66	1994.11.03	17:00	24.4	65	1,022.4	5.2	65
STS-63	1995.02.03	05:22	13.2	83	1,018.7	5.2	239
STS-67	1995.03.02	06:38	17.6	87	1,014.0	4.8	257
STS-71	1995.06.27	19:32	29.6	83	1,016.0	4.0	89
STS-70	1995.07.13	13:42	28.4	80	1,016.7	2.7	51
STS-69	1995.09.07	15:09	28.9	77	1,011.9	3.3	160
STS-73	1995.10.20	13:53	25.1	99	1,012.6	2.8	297
STS-74	1995.11.12	12:31	9.8	82	1,019.0	5.0	301
STS-72	1996.01.11	09:41	4.9	87	1,020.1	4.2	290
STS-75	1996.02.22	20:18	22.7	78	1,014.6	2.9	64
STS-76	1996.03.22	08:13	7.3	88	1,016.0	3.8	253
STS-77	1996.05.19	10:30	21.3	95	1,018.7	0.8	239
STS-78	1996.06.20	14:49	28.4	77	1,015.6	0.8	266
STS-79	1996.09.16	08:55	26.0	86	1,014.0	4.2	153
STS-80	1996.11.19	19:56	25.1	49	1,011.9	3.2	240
STS-81	1997.01.12	09:27	16.2	79	1,020.1	4.3	343
STS-82	1997.02.11	08:55	11.1	94	1,021.4	3.3	299
STS-83	1997.04.04	19:21	23.7	50	1,021.4	4.5	127



Table 231. L-0 surface observations summary.

<b>Mission</b>	<b>Launch Date</b>	<b>Time (UTC)</b>	<b>Temperature (°C)</b>	<b>Relative Humidity (%)</b>	<b>Sea Level Pressure (hPa)</b>	<b>Wind Speed (m/s)</b>	<b>Wind Direction (deg)</b>
STS-84	1997.05.15	08:08	21.2	82	1,015.3	2.5	300
STS-94	1997.07.01	18:02	28.7	74	1,014.0	4.6	35
STS-85	1997.08.07	14:41	28.3	81	1,017.4	2.8	20
STS-86	1997.09.26	02:34	26.2	92	1,010.6	3.4	188
STS-87	1997.11.19	19:46	20.2	69	1,020.6	6.4	358
STS-89	1998.01.23	02:48	20.0	89	1,016.7	7.9	149
STS-90	1998.04.17	18:19	27.0	63	1,018.0	6.3	144
STS-91	1998.06.02	22:06	35.4	54	1,009.6	5.3	232
STS-95	1998.10.29	19:20	24.9	53	1,015.2	2.9	16
STS-88	1998.12.04	08:36	22.2	83	1,020.1	3.4	133
STS-96	1999.05.27	10:50	20.9	96	1,016.7	2.9	235
STS-93	1999.07.23	04:31	25.6	89	1,017.3	1.4	233
STS-103	1999.12.20	00:50	18.9	74	1,016.7	2.7	312
STS-99	2000.02.11	17:43	19.3	60	1,020.7	5.5	155
STS-101	2000.05.19	10:11	22.2	77	1,022.4	3.4	128
STS-106	2000.09.08	12:46	27.2	80	1,014.6	4.1	8
STS-92	2000.10.11	23:17	22.8	67	1,020.6	6.8	50
STS-97	2000.12.01	03:06	17.2	65	1,022.4	3.9	7
STS-98	2001.02.07	23:13	18.3	83	1,024.7	2.7	59
STS-102	2001.03.08	11:42	5.6	71	1,018.6	3.6	289
STS-100	2001.04.19	18:41	20.6	38	1,026.1	3.3	76
STS-104	2001.07.12	09:04	24.7	95	1,014.6	4.0	218
STS-105	2001.08.10	21:10	29.1	76	1,016.6	4.9	103
STS-108	2001.12.05	22:19	23.2	80	1,023.4	7.2	52
STS-109	2002.03.01	11:22	15.6	73	1,025.7	6.3	66
STS-110	2002.04.08	20:44	24.4	51	1,023.4	7.9	131
STS-111	2002.06.05	21:23	28.9	73	1,015.2	4.9	105
STS-112	2002.10.07	19:46	28.3	69	1,013.5	6.4	20
STS-113	2002.11.24	00:50	13.9	75	1,024.0	2.7	4
STS-107	2003.01.16	15:39	18.3	68	1,024.0	0.8	173

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